Installation and Configuration Guide

Trademark Notices

Comtrol, NS-Link, and DeviceMaster are trademarks of Comtrol Corporation.

Microsoft and Windows are registered trademarks of Microsoft Corporation.

HyperTerminal is a registered trademark of Hilgraeve, Inc.

Portions of SocketServer are copyrighted by GoAhead Software, Inc. Copyright © 2001. GoAhead Software, Inc. All Rights Reserved.

Other product names mentioned herein may be trademarks and/or registered trademarks of their respective owners.

Second Edition, August 14, 2009
Copyright © 2001 - 2009. Comtrol Corporation.
All Rights Reserved.

Comtrol Corporation makes no representations or warranties with regard to the contents of this document or to the suitability of the Comtrol product for any particular purpose. Specifications subject to change without notice. Some software or features may not be available at the time of publication. Contact your reseller for current product information.

Document Number: 2000506 Rev. B

***Replaces*: 2000334, 2000337, and 2000340**

Table of Contents

Introduction 7
- **Installation and Configuration Overview** 7
  - NS-Link COM Port Driver Installation 7
    - Step 1: Hardware Installation 7
    - Step 2: Install PortVision Plus 7
    - Step 3: Program the DeviceMaster IP Address 7
    - Step 4: Install NS-Link Device Driver for Windows 7
    - Step 5: Configure NS-Link Port Properties Page 8
    - Step 6: Configure Socket Ports 8
    - Step 7: Serial Device Connection 8
  - Secure COM Port Redirector Installation Overview 8
    - Step 1: Hardware Installation 8
    - Step 2: Install PortVision Plus 8
    - Step 3: Program the DeviceMaster IP Address 8
    - Step 4: Update SocketServer 8
    - Step 5: Configure SocketServer 8
    - Step 6: Install the Port Redirector 8
    - Step 7: Add and Configure the COM Port 8
    - Step 8: Serial Device Connection 8
  - NS-Link tty Port Installation Overview 9
    - Step 1: Hardware Installation 9
    - Step 2: Install PortVision Plus 9
    - Step 3: Program the DeviceMaster IP Address 9
    - Step 4: Install the NS-Link Device Driver for Linux 9
    - Step 5: Configure Socket Ports 9
    - Step 6: Serial Device Connection 9
  - TCP/IP Socket Port Installation Overview 9
    - Step 1: Hardware Installation 9
    - Step 2: Install PortVision Plus 9
    - Step 3: Program the DeviceMaster IP Address 9
    - Step 4: Update SocketServer 10
    - Step 5: Configure the Socket Ports 10
    - Step 6: Serial Device Connection 10
- **Locating Software and Documentation** 10
- **Developer's Kit** 11

Hardware Installation 13
- **Installation Overview** 13
- **1-Port - Enclosed Models** 14
- **1-Port - Embedded Model** 16
  - Building the Serial Ribbon Cable 16
  - Mounting the Embedded 17
  - Attaching the Network and Serial Cables 18
  - Connecting the Power and Verifying Installation 18
- **2-Port (Serial Terminal) 1E/2E Models** 20
- **2-Port (DB9) 1E/2E Models** 22
- **4-Port and 8-Port Models** 24
- **16-Port (DeviceMaster RTS - External Power Supply)** 26
- **16-Port (DeviceMaster PRO)** 28
- **16/32-Port Rack Mount Models (Internal Power Supply)** 30

Initial Configuration 33
- **PortVision Plus Requirements** 33
- **Installing PortVision Plus** 33
- **Configuring the Network Settings** 34
- **Checking the SocketServer Version** 36
- **Uploading SocketServer** 37

Device Driver Installation 39
- **Linux Installation** 39
- **Windows Installation** 39
  - Windows Vista: NS-Link Installation 40
  - Windows XP and Windows Server 2003: NS-Link Installation 41
  - Windows 2000: NS-Link Installation 42
- **Configuring the NS-Link Driver for Windows** 43
- **Configuring COM Port Properties for Windows** 44

Secure COM Port Set Up 45
- **Secure COM Port Redirector Overview** 45
- **Configuring Serial Ports and Enabling Security** 45
- **Installing the Secure COM Port Redirector** 47
- **Configuring Secure Redirector COM Ports** 48
  - Adding a Secure Port 48
  - Configuring the Secure COM Port 48

Socket Port Configuration 49
- **SocketServer Overview** 49
- **SocketServer Architecture** 50
- **Accessing Socket Configuration** 51
  - Web Browser 51
  - PortVision Plus 51
    - Web Manager Button 51
    - Configure Device Page 51
- **SocketServer Versions** 52

Connecting Serial Devices 53
- **Connecting Devices** 53
- **DeviceMaster 1/4/8/16/32-Port Models** 53
- **DeviceMaster 2-Port with Serial Terminals** 56
  - Serial Terminal (4) Signals (1E) 56
  - Serial Terminal (8) Signals (2E) 57
- **DeviceMaster 2-Port (1E/2E) DB9 Connectors** 58
- **DB9 Serial Cables and Loopback Plugs** 59
  - DB9 Loopback Plugs 59
  - DB9 Null-Modem Cables (RS-232) 60
  - DB9 Null-Modem Cables (RS-422) 60
  - DB9 Straight-Through Cables (RS-232/485) 60
- **RJ45 Serial Cables and Loopback Plugs** 61
  - RJ45 Null-Modem Cables (RS-232) 61
  - RJ45 Null-Modem Cables (RS-422) 62
  - Straight-Through Cables (RS-232/485) 62
  - RJ45 Loopback Plugs 62
  - RS-485 Test Cable 62

DeviceMaster 1E (Serial Terminals) Cables and Loopbacks **63**
Serial Terminal (4) Null-Modem Cables (RS-232) 63
Serial Terminal (4) Null-Modem Cables (RS-422) 63
Serial Terminal (4) Straight-Through Cables (RS-232/485) 64
1E Loopback Signals 64
DeviceMaster 2E (Serial Terminals) Cables and Loopbacks **65**
Serial Terminal (8) Null-Modem Cables (RS-232) 65
Serial Terminal (8) Null-Modem Cables (RS-422) 65
Serial Terminal (8) Straight-Through Cables (RS-232/485) 66
2E Loopback Signals 66

Managing the DeviceMaster **67**
Rebooting the DeviceMaster **67**
Uploading SocketServer to Multiple DeviceMasters **68**
Configuring Multiple DeviceMasters Network Addresses **68**
Using Configuration Files **69**
Managing Bootloader **70**
Checking the Bootloader Version 70
Uploading Bootloader 70
Adding a DeviceMaster to an Existing Installation **72**
Replacing a DeviceMaster **72**
Device Programmed with IP Address 72
Device Programmed with MAC Address 72
Restoring Factory Defaults (2-Port, Only) **73**
Restoring Serial Port Settings **73**
NS-Link COM Port 73
Socket Port 73

RedBoot Procedures **75**
Overview **75**
Establishing a Serial Connection 75
Establishing a Telnet Connection 76
Determining the Network Settings **77**
Configuring the Network Settings **77**
Determining the Bootloader Version **78**
Resetting the DeviceMaster **78**
Uploading Firmware **79**
Serial Method 79
Telnet Method 80
Configuring Passwords **82**
Redboot Command Overview **83**

Hardware Specifications **85**
Locating DeviceMaster Specifications **85**
Serial Communications **85**
External Power Supply Specifications **87**
1-Port 5VDC Power Supply 87
1-Port 5-30VDC Power Supply 87
2-Port (Serial Terminals) Power Supply 88
2-Port (DB9) Power Supply 88
4-Port Power Supply 88
8-Port Power Supply 88
16-Port Power Supplies 89

DeviceMaster Product Pictures **90**
1-Port (DB9) 5VDC 90
1-Port (DB9) 5-30VDC 91
1-Port Embedded 92
2-Port (Single Ethernet Port) with Serial Terminals 92
2-Port (Dual Ethernet Ports) with Serial Terminals 92
2-Port (Single Ethernet Port) DB9 93
2-Port (Dual Ethernet Ports) DB9 93
4-Port (DB9) 94
8-Port (DB9) 94
16-Port (RJ45) External Power Supply 94
16-Port (RJ45) Internal Power Supply 94
DeviceMaster PRO 16-Port (RJ45) 94
DeviceMaster Serial Hub 16-Port (DB9) 94
DeviceMaster RTS 32-Port (RJ45) 95
Notices **96**
Radio Frequency Interference (RFI) (FCC 15.105) 96
Labeling Requirements (FCC 15.19) 96
Modifications (FCC 15.21) 96
Serial Cables (FCC 15.27) 96
Underwriters Laboratory 96
Important Safety Information 96

Troubleshooting and Technical Support **97**
Troubleshooting Checklist **97**
General Troubleshooting **99**
Daisy-Chaining DeviceMaster 2E/4/8/16-Port Units **101**
Technical Support **102**

Index **103**

Introduction

This section provides an installation and configuration overview for the DeviceMaster platform:

- DeviceMaster PRO
- DeviceMaster RTS
- DeviceMaster Serial Hub

In addition, it provides links to download the latest files for the DeviceMaster installation. Optionally, you can use the Software and Documentation CD to install the DeviceMaster.

Installation and Configuration Overview

There are four basic installations depending on your requirements. You can use the appropriate overview to install and configure the DeviceMaster for your environment.

- NS-Link COM port device driver
- Secure COM port redirector
- NS-Link tty port device driver
- TCP/IP socket port

NS-Link COM Port Driver Installation

Use the following steps, which are discussed in detail in the subsequent sections, to install and configure the DeviceMaster to run the NS-Link device driver for Windows operating systems.

- *Step 1: Hardware Installation*
- *Step 2: Install PortVision Plus*
- *Step 3: Program the DeviceMaster IP Address*
- Step 4: Install NS-Link Device Driver for Windows on Page 7
- Step 5: Configure NS-Link Port Properties Page on Page 8
- Step 6: Configure Socket Ports on Page 8
- Step 7: Serial Device Connection on Page 8

Step 1: Hardware Installation

Power up the DeviceMaster. Technical Support suggests installing one DeviceMaster at a time to avoid configuration problems. Refer to Hardware Installation on Page 13 for detailed installation procedures for your DeviceMaster model.

Step 2: Install PortVision Plus

Comtrol recommends connecting the DeviceMaster to a PC or laptop running Windows® 2000/XP/2003/Vista so that you can install PortVision Plus for easy IP address configuration. See PortVision Plus Requirements on Page 33 and use then refer to Installing PortVision Plus on Page 33 to install PortVision Plus.

Step 3: Program the DeviceMaster IP Address

See Configuring the Network Settings on Page 34 for detailed configuration procedures.

Step 4: Install NS-Link Device Driver for Windows

See Windows Installation on Page 39 for an installation overview of the NS-Link driver for each Windows operating system.

Step 5: Configure NS-Link Port Properties Page	Configuring the NS-Link Driver for Windows on Page 43 provides and overview of COM port configuration and Configuring COM Port Properties for Windows on Page 44 provides DeviceMaster device configuration information.
Step 6: Configure Socket Ports	Optionally, you may need to configure one or more ports for socket mode. See Socket Port Configuration on Page 49 for information about configuring socket ports using the Server Configuration web page.
Step 7: Serial Device Connection	Connect the serial devices to the DeviceMaster. Refer to Connecting Serial Devices on Page 53 for cabling and connector information.

Secure COM Port Redirector Installation Overview

Use the following steps, which are discussed in detail in the subsequent sections, to install and configure the secure COM port redirector for the DeviceMaster.

- *Step 1: Hardware Installation*
- *Step 2: Install PortVision Plus*
- *Step 3: Program the DeviceMaster IP Address*
- *Step 4: Update SocketServer*
- *Step 5: Configure SocketServer*
- *Step 6: Install the Port Redirector*
- *Step 7: Add and Configure the COM Port*
- *Step 8: Serial Device Connection*

Step 1: Hardware Installation	Power up the DeviceMaster. Technical Support suggests installing one DeviceMaster at a time to avoid configuration problems. Refer to Hardware Installation on Page 13 for detailed installation procedures for your DeviceMaster model.
Step 2: Install PortVision Plus	Comtrol recommends connecting the DeviceMaster to a PC or laptop running Windows® 2000/XP/2003/Vista so that you can install PortVision Plus for easy IP address configuration. See PortVision Plus Requirements on Page 33 and use then refer to Installing PortVision Plus on Page 33 to install PortVision Plus.
Step 3: Program the DeviceMaster IP Address	See Configuring the Network Settings on Page 34 for procedures on IP address configuration procedures.
Step 4: Update SocketServer	If necessary, update SocketServer. You can use Checking the SocketServer Version on Page 36 and then refer to Locating Software and Documentation on Page 10 to locate the latest version on the web site. See Uploading SocketServer on Page 37 if you need to update SocketServer.
Step 5: Configure SocketServer	Configure the serial port characteristics and enable the security feature in the SocketServer. Refer to Configuring Serial Ports and Enabling Security on Page 45 for detailed set-up procedures.
Step 6: Install the Port Redirector	Refer to Installing the Secure COM Port Redirector on Page 47 for installation procedures.
Step 7: Add and Configure the COM Port	Refer to Configuring Secure Redirector COM Ports on Page 48 to complete the set up of the secure COM port redirector.
Step 8: Serial Device Connection	Connect the serial devices to the DeviceMaster. Refer to Connecting Serial Devices on Page 53 for cabling and connector information.

NS-Link tty Port Installation Overview

Use the following steps, which are discussed in detail in the subsequent sections, to install and configure the DeviceMaster to run the NS-Link device driver for Linux operating systems.

- *Step 1: Hardware Installation*
- *Step 2: Install PortVision Plus*
- *Step 3: Program the DeviceMaster IP Address*
- *Step 4: Install the NS-Link Device Driver for Linux*
- *Step 5: Configure Socket Ports*
- *Step 6: Serial Device Connection*

Step 1: Hardware Installation

Power up the DeviceMaster. Technical Support suggests installing one DeviceMaster at a time to avoid configuration problems. Refer to Hardware Installation on Page 13 for detailed installation procedures for your DeviceMaster model.

Step 2: Install PortVision Plus

Comtrol recommends connecting the DeviceMaster to a PC or laptop running Windows® 2000/XP/2003/Vista so that you can install PortVision Plus for easy IP address configuration. See PortVision Plus Requirements on Page 33 and use then refer to Installing PortVision Plus on Page 33 to install PortVision Plus.

Step 3: Program the DeviceMaster IP Address

See Configuring the Network Settings on Page 34 for procedures on IP address configuration procedures.

Step 4: Install the NS-Link Device Driver for Linux

Locate and unpackage the driver assembly. Refer to the readme file packaged with the Linux driver assembly for driver installation and configuration procedures for the tty port.

Step 5: Configure Socket Ports

Optionally, you may need to configure one or more ports for socket mode. See Socket Port Configuration on Page 49 for information about configuring socket ports using the *Server Configuration* web page.

Step 6: Serial Device Connection

Connect the serial devices to the DeviceMaster. Refer to Connecting Serial Devices on Page 53 for cabling and connector information.

TCP/IP Socket Port Installation Overview

Use the following steps, which are discussed in detail in the subsequent sections, to configure DeviceMaster socket ports.

- *Step 1: Hardware Installation*
- *Step 2: Install PortVision Plus*
- *Step 3: Program the DeviceMaster IP Address*
- Step 4: Update SocketServer on Page 10
- Step 5: Configure the Socket Ports on Page 10
- Step 6: Serial Device Connection on Page 10

Step 1: Hardware Installation

Power up the DeviceMaster. Technical Support suggests installing one DeviceMaster at a time to avoid configuration problems. Refer to Hardware Installation on Page 13 for detailed installation procedures for your DeviceMaster model.

Step 2: Install PortVision Plus

Comtrol recommends connecting the DeviceMaster to a PC or laptop running Windows® 2000/XP/2003/Vista so that you can install PortVision Plus for easy IP address configuration. See PortVision Plus Requirements on Page 33 and use then refer to Installing PortVision Plus on Page 33 to install PortVision Plus.

Step 3: Program the DeviceMaster IP Address

See Configuring the Network Settings on Page 34 for procedures on IP address configuration procedures.

Step 4: Update SocketServer	If necessary, update SocketServer. You can use Checking the SocketServer Version on Page 36 and then refer to Locating Software and Documentation on Page 10 to locate the latest version on the web site. See Uploading SocketServer on Page 37 if you need to update SocketServer.
Step 5: Configure the Socket Ports	Configure the serial socket ports using the PortVision Plus property pages or enter the IP address in a web browser and use the SocketServer web pages.
Step 6: Serial Device Connection	Connect the serial devices to the DeviceMaster. Refer to Connecting Serial Devices on Page 53 for cabling and connector information.

Locating Software and Documentation

You can access the appropriate software assembly, PortVision Plus, and the *DeviceMaster* documentation from the CD shipped with the DeviceMaster. Optionally, if you know what you need for your installation, you can download the latest files using these internet links.

If you are not sure what files are required for your installation, each installation and configuration overview also provides links to the required files in this *Guide.*

Software	Operating Systems	Web
PortVision Plus	Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32-bit)	
SocketServer	The firmware that comes pre-installed on your DeviceMaster platform, which provides an interface to TCP/IP socket mode configuration and services.	
Bootloader	The operating system that runs on the DeviceMaster hardware during the power on phase, which then loads SocketServer.	

NS-Link Device Drivers and Installation Documentation		
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32/64-bit)	Device driver (COM ports)	
	NS-Link User Guide for Windows	
Linux (32/64-bit)	Device driver (tty ports)	

Secure COM Port Redirector		
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32/64-bit)	Secure COM port redirector	

Installation Document (this guide)	
DeviceMaster Installation and Configuration Guide	

Port Testing and Monitoring Applications		
Windows 2000 (32-bit) Windows XP (32/64-bit) Windows Server 2003 (32/64-bit) Windows Vista (32-bit)	Comtrol Utilities (Test Terminal and Port Monitor)†	
Linux (32-bit)	LCOM	
† Test Terminal and Port Monitor are included in PortVision Plus.		

Developer's Kit

In addition to the standard capabilities of the DeviceMaster they are also a fully-programmable, embedded computing, platform.

If you are interested in writing your own applications for the DeviceMaster or would like information on how to obtain the Comtrol DeviceMaster Developer's Kit, see http://www.comtrol.com/products/family/dmrtsdk or please contact your Comtrol sales representative.

Note: *The DeviceMaster PRO is shipped with the Developer's Kit. The DeviceMaster RTS supports the Developer's Kit. The DeviceMaster Serial Hub is not supported in the Developer's Kit.*

Hardware Installation

Installation Overview

Default Network Settings

IP address:
192.168.250.250

Subnet mask:
255.255.0.0

Gateway address:
192.168.250.1

The DeviceMaster enables communications with serial devices over an Ethernet network. The DeviceMaster provides for remote management, configuration, and connectivity through its 10/100BASE–T Ethernet connection.

Use the links below to locate installation procedures for the following models:

DeviceMaster PRO

DB9 serial ports with dual Ethernet†† ports	8†	4-Port and 8-Port Models on Page 24
RJ45 serial ports with dual Ethernet†† ports	16	16-Port (DeviceMaster PRO) on Page 28

DeviceMaster RTS

DB9 serial port with a single Ethernet port	1	1-Port - Enclosed Models on Page 14
Embedded system	1	1-Port - Embedded Model on Page 16
Screw terminal serial ports	2‡	2-Port (Serial Terminal) 1E/2E Models on Page 20
DB9 serial ports	2‡	2-Port (DB9) 1E/2E Models on Page 22
DB9 serial ports with dual Ethernet†† ports	4† or 8†	4-Port and 8-Port Models on Page 24
RJ45 serial ports with dual Ethernet†† ports	16	16-Port (DeviceMaster RTS - External Power Supply) on Page 26
RJ45 serial ports with a single Ethernet port	16 or 32	16/32-Port Rack Mount Models (Internal Power Supply) on Page 30

DeviceMaster Serial Hub

DB9 serial ports with dual Ethernet†† ports	8	4-Port and 8-Port Models on Page 24
DB9 serial ports with a single Ethernet port	16	16/32-Port Rack Mount Models (Internal Power Supply) on Page 30

† *The DeviceMaster RTS 4 and 8-port models may also include DB9 to RJ45 adapters.*

†† *One of the Ethernet ports on the DeviceMaster is a built-in downstream port for daisy-chaining DeviceMaster systems or other network-ready devices.*

‡ *Either Ethernet port on the DeviceMaster RTS 2-port 2E model can be used for daisy-chaining DeviceMaster systems or other network-ready devices.*

1-Port - Enclosed Models

Use the following procedure to install the DeviceMaster 1-Port.

1. Record the MAC address and serial number of the DeviceMaster on the customer service label provided.

   You may need the MAC address during driver configuration. The MAC address (starts with **00 C0 4E**) and serial number are located on a label on the DeviceMaster.

   Note: *Do not connect multiple units until you have changed the default IP address, see* *Initial Configuration on Page 33*.

2. Place the 1-Port on a stable surface and skip to Step 3 or optionally mount the DeviceMaster using the mounting flanges or DIN rail adapters.

   a. Pick up the DeviceMaster so that the front of the device is facing you.

   b. Pick up a DIN rail clip. (The three tines should be on top and the **M4** label should face you.)

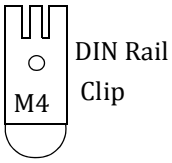
   c. Slide the DIN rail clip behind the DeviceMaster and line it up with one of the screw holes on the DeviceMaster.

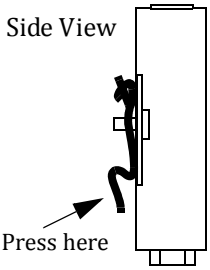
   d. Insert the **M4** screw into the hole and tighten with a Phillips screwdriver.

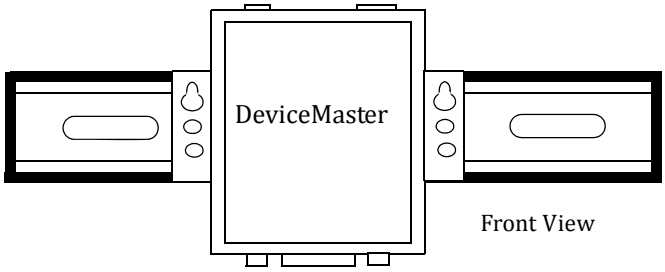
   e. Repeat Steps b through d with the second DIN rail clip. Make sure the screws on both DIN rail clips line up.

      Note: *If you need to remove the DeviceMaster from the DIN rail, exert pressure on the backside of the tabs at the bottom of both DIN rail clips.*

   f. Attach the DeviceMaster to the DIN rail.







3. Connect the DeviceMaster port labeled **10/100 ETHERNET** to the same Ethernet network segment as the host PC using a standard network cable.

   If you plan on using the NS-Link device driver, make sure that you do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The NS-Link default port setting is RS-232.

   Caution

4. Apply power to the DeviceMaster using the appropriate procedure for your power supply.

   Note: *The supported input voltage (5VDC or 5-30VDC) is printed on the DeviceMaster.*

   5VDC Power Supply (Barrel Connector)

   - Connect the 5VDC power supply to the DeviceMaster and to a power outlet.
   - Go to Step 5 to verify that the DeviceMaster is functioning properly.

5-30VDC with Screw Terminal Power Connector

Use the following procedure power on this model.

Caution

Observe proper ESD techniques when connecting and disconnecting the DeviceMaster.

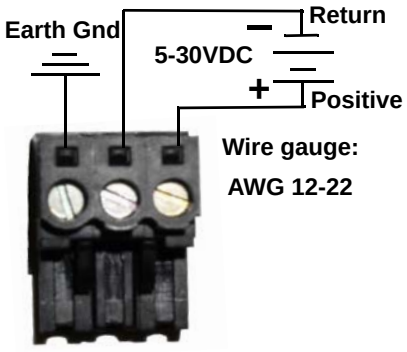
- Insert the earth ground wire into the earth ground screw terminal.
- Insert the DC positive wire into the positive screw terminal and the DC return wire into the return screw terminal.

  If you purchased the Comtrol power supply (separately), the wires are identified below:

  - Red = 5-30VDC positive
  - White = 5-30VDC return
  - Black = earth ground

  If you did not purchase a power supply from Comtrol for the DeviceMaster, see 1-Port 5-30VDC Power Supply on Page 87 for power requirements.

Screw Terminal Power Connector



- Use a small flat head screw to lock the wires into place.
- Verify that each wire has been tightened securely.
- Plug the screw terminal power connector into the DeviceMaster.

  Note: *Align the plug properly. The scalloped side of the screw terminal power connector should be aligned with the scalloped side of the power jack on the unit.*

- Connect the power supply to a power source.
- Go to Step 5 to verify that the DeviceMaster is functioning properly.

5. Verify that the **Status** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the table below.

1-Port Enclosed LED Descriptions	
Status	The amber **Status** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
Link/Act	If the red **Link/Act** LED is lit, it indicates a working Ethernet connection.
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Note: *For additional LED information, go to the* **Status** *LED table on Page 97.*	

6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

1-Port - Embedded Model

Installing the DeviceMaster 1-Port Embedded system follows these basic steps:

- Building the serial ribbon cable (below).
- Mounting the Embedded on Page 17 and installing light pipes.
- Attaching the Network and Serial Cables on Page 18.
- Connecting the Power and Verifying Installation on Page 18.

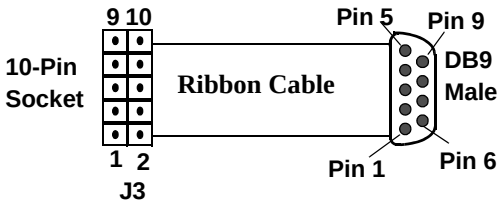
Observe proper ESD techniques when handling the DeviceMaster.

Caution

Building the Serial Ribbon Cable

Use the following information to build a DB9 serial ribbon cable to connect to the DeviceMaster 1-Port Embedded IDC10 connector (**J3**).

IDC10	1	2	3	4	5	6	7	8	9
DB9M	1	6	2	7	3	8	4	9	5



J3 Header	RS-232	RS-422	RS-485
1	CD	Not used	Not used
2	DSR	Not used	Not used
3	RxD	RxD-	Not used
4	RTS	TxD+	TRX+
5	TxD	TxD-	TRX-
6	CTS	RxD+	Not used
7	DTR	Not used	Not used
8	RI	Not used	Not used
9	GND	Not used	Not used
10	Not connected		

Mounting the Embedded

Use the following procedure to mount the DeviceMaster 1-Port Embedded with the 5-30VDC power supply.

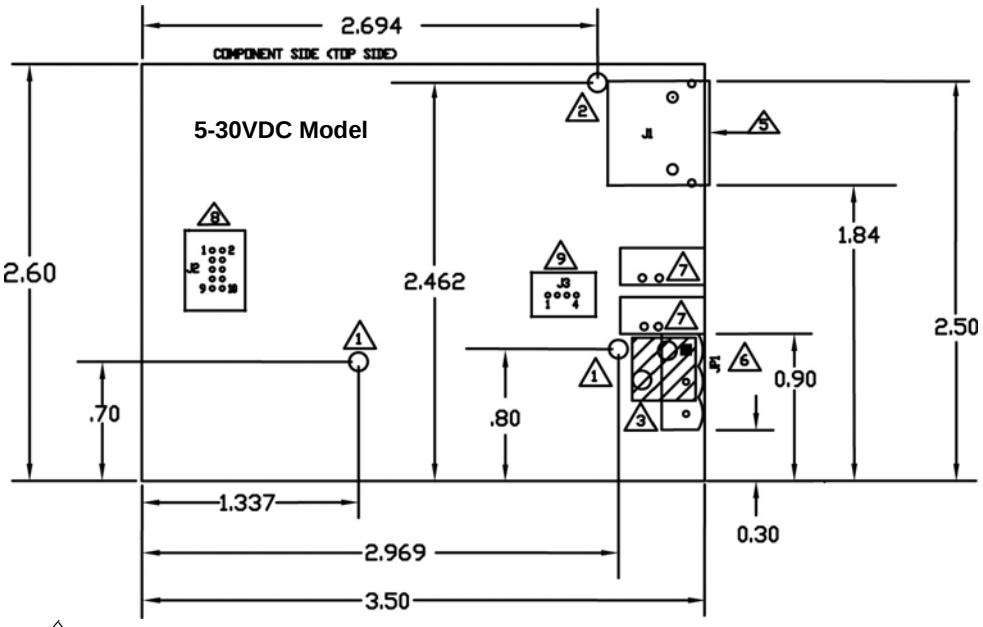
Observe proper ESD techniques when handling the DeviceMaster.

Caution

1. Carefully remove the DeviceMaster from the anti-static bag, following standard electrostatic device handling procedures.

   Note: *Write down the MAC address located on a label on the bottom (solder side) center of the DeviceMaster because you may need it during configuration.*

2. Mount the DeviceMaster for your environment using 1/4" stand-offs to separate the DeviceMaster from the base.



1. Non-plated/non-grounded mounting holes 0.116" diameter (+/-0.003").
2. Plated/chassis grounded mounting hole 0.116" diameter (+/-0.003").
3. WARNING: Holes in hatched area are not mounting holes.
4. Maximum component height above board is 0.55".
5. Ethernet connection J2: J2 overhangs board edge by 0.14" and the height is 0.55".
6. Power connector; the mating connector is Weidmuller P/N: 152651.
7. LED light pipe mounting holes. The LED light pipes are not provided.
8. Serial port connector J3: 0.1" pin spacing, 0.025" square pin diameter, and 0.230" pin height.
9. Debug port connector J4: 0.1" pin spacing, 0.025" square pin diameter, and 0.230" pin height.

Caution

3. Use one of the following methods to ground the DeviceMaster.
   - Through the **power supply** by connecting the ground wire on the power cable using plastic or metal stand-offs.
   - Through the **chassis**, using metal stand-offs. If plastic stand-offs are used to mount the board, then you must ground the DeviceMaster using the power cable.

   Note: *The maximum diameter of the metal stand-offs should be 0.175" with a 4-40 machine screw. Metal stand-offs are not provided with the DeviceMaster.*

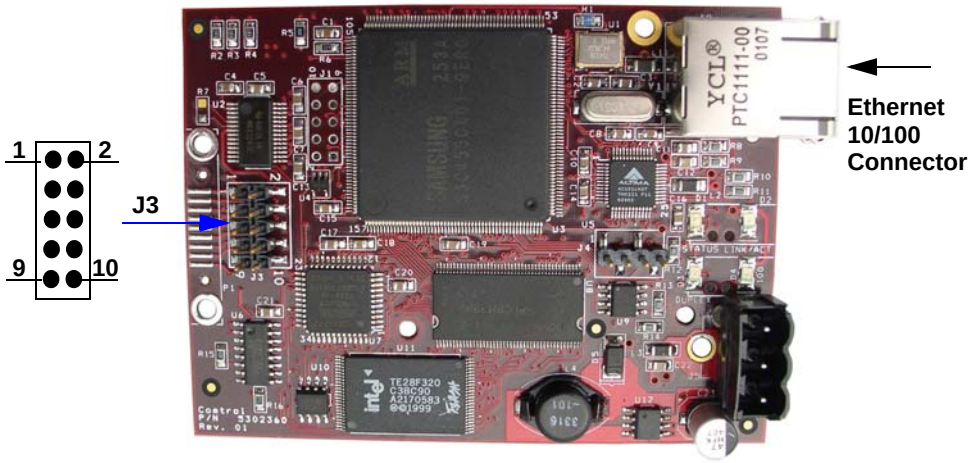
4. Optionally, attach the light pipes. The following light pipes have been tested and found to function; Bivar, Inc. (P/N:LP-230) and Ledtronics, Inc. (P/N:LTP003-0CW-001).

After mounting the DeviceMaster, you are ready to connect the cables.

Attaching the Network and Serial Cables

Use the following procedure to attach the serial ribbon and Ethernet cables. For a larger illustration of the system, see 1-Port Embedded on Page 92.

1. Attach the ribbon cable built in Building the Serial Ribbon Cable on Page 16 to the header labeled **J3**.



2. Connect a standard Ethernet cable from the RJ45 port on the DeviceMaster to your Ethernet hub.

Caution

The default serial port setting on the DeviceMaster is RS-232. Do not connect the serial device until you have configured the serial port settings. You must configure network settings and upload firmware before configuring the serial port settings.

Use the next subsection to wire the power terminal connector and verify the hardware installation.

Connecting the Power and Verifying Installation

Use the following procedure to wire the power terminal connector and connect the DeviceMaster to a power source.

Caution

Observe proper ESD techniques when connecting and disconnecting the DeviceMaster.

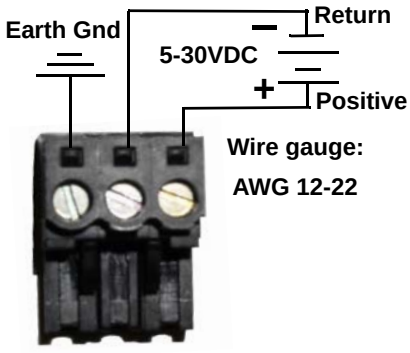
1. Insert the earth ground wire into the earth ground screw terminal.
2. Insert the DC positive wire into the positive screw terminal and the DC return wire into the return screw terminal.

   If you purchased the Comtrol power supply (separately), the wires are identified below:

   - Red = 5-30VDC positive
   - White = 5-30VDC return
   - Black = earth ground

   If you did not purchase a power supply from Comtrol for the DeviceMaster, see 1-Port 5-30VDC Power Supply on Page 87 for power requirements.

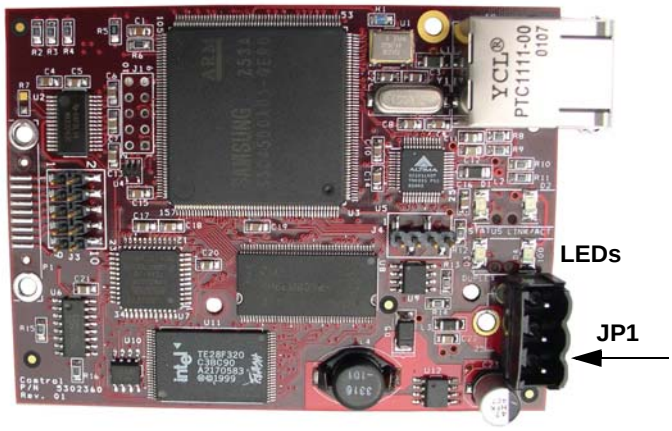
Screw Terminal Power Connector



3. Use a small flat head screw to lock the wires into place.
4. Verify that each wire has been tightened securely.

5. Plug the screw terminal power connector into the DeviceMaster.
6. Connect the power supply to a power source.
7. Plug the screw terminal power connector into **JP1** on the DeviceMaster by aligning the scalloped sides.

   Note: *Align the plug properly. The scalloped side of the screw terminal power connector should be aligned with the scalloped side of the power jack on the unit.*



8. Apply power to the DeviceMaster.
9. Verify the **Status** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the table below.

   The LEDs are located between the RJ45 connector and the power terminal block.

LED Descriptions	
Status	When lit, the amber **Status** LED (**D1**) on the DeviceMaster indicates the devices is fully powered and has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
Link/ Act	When lit, the red **Link/Act** LED (**D2**) indicates a working Ethernet connection.
Duplex	When lit, the red **Duplex** (**D3**) LED indicates full-duplex activity.
100	When lit, the red **100** (**D4**) LED indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Note: *For additional LED information, go to the* **Status** *LED table on Page 97.*	

10. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

2-Port (Serial Terminal) 1E/2E Models

Use the following procedure to install DeviceMaster 2-port models with serial terminal connectors. See 2-Port (DB9) 1E/2E Models on Page 22 if the DeviceMaster has DB9 serial connectors.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The MAC address (starts with **00 C0 4E**) and serial number are located on a label on the DeviceMaster.

2. Attach the DeviceMaster 2-Port to the DIN rail adapter.

3. Connect the power supply and apply power to the DeviceMaster using the power supply specifications on the product label and the following information.

   Caution

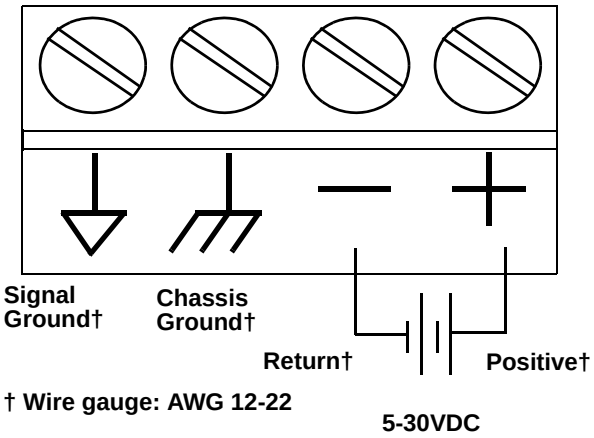
   Observe proper ESD techniques when connecting and disconnecting the DeviceMaster***.***

   a. Insert the earth ground wire into the chassis ground screw terminal. The chassis ground connection is made only if the DIN rail is NOT connected to signal ground.

   b. Insert the DC positive wire into the + screw terminal and the DC return wire into the - screw terminal.

   If you purchased the Comtrol power supply (separately), the wires are identified below:

   - Red = 5-30VDC positive
   - White = 5-30VDC return
   - Black = chassis ground

   Signal Ground is used to connect RS-232 devices later in the installation.

   If you did not purchase a power supply from Comtrol for the DeviceMaster, see 2-Port (Serial Terminals) Power Supply on Page 88 for power requirements.

   c. Use a small flat head screw driver to lock the wires into place.

   d. Verify that each wire has been tightened securely.

   e. Connect the power supply to a power source.

   Note: *Do not connect multiple units until you have changed the default IP address, see Initial Configuration on Page 33.*

4. Use the appropriate method for network attachment of your DeviceMaster 2-port:

   DeviceMaster **1E:** Connect the **10/100 port** to the same Ethernet network segment as the host PC using a standard network cable.

   DeviceMaster **2E:** Connect the DeviceMaster 2E using one of these methods:

   - **Ethernet hub, switch (10/100Base-T), Server NIC (10/100Base-T)**: Connect a **10/100** port to the same Ethernet network segment as the host PC using a standard Ethernet cable.
   - **Daisy-chaining DeviceMaster units**: Connect the port labeled **E1** (or **E2**) on the first DeviceMaster to the port labeled **E1** (or **E2**) on the second DeviceMaster or other device using a standard Ethernet cable.

Do not connect RS-422/485 devices until the appropriate port interface type has been configured. The default port setting is RS-232.

5. Verify that the **Status** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the following table.

2-Port LED Descriptions	
STATUS	The **STATUS** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **STATUS** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds*.
LINK	If the **LINK** (green) LED is lit, it indicates a working Ethernet connection.
ACT	If the **ACT** (yellow) LED flashes, it indicates network activity.
Note: *For additional LED information, go to the* **STATUS** *LED table on Page 97.*	

6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

2-Port (DB9) 1E/2E Models

Use the following procedure to install DeviceMaster 2-port models with DB9 connectors.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The MAC address (starts with **00 C0 4E**) and serial number are located on a label on the DeviceMaster.

2. Attach the DeviceMaster 2-Port to the DIN rail adapter.
3. Connect the power supply and apply power to the DeviceMaster using the power supply specifications on the product label and the following information.

Caution

Observe proper ESD techniques when connecting and disconnecting the DeviceMaster.

   a. Insert the earth ground wire into the chassis ground screw terminal.

      Note: *The chassis ground connection is made only if the DIN rail is NOT connected to earth ground.*

   b. Insert the DC positive wire into one of the + screw terminals and the DC return wire into the - screw terminal.

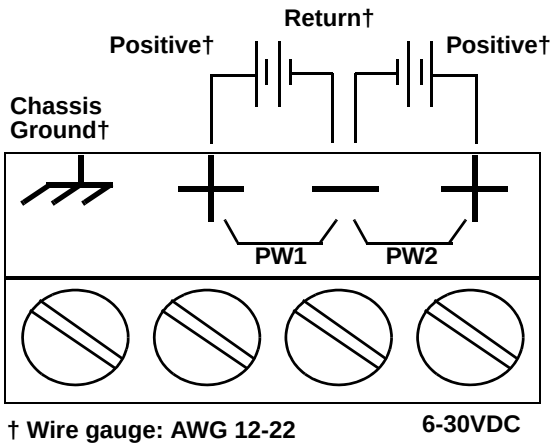
      A second redundant power supply can be connected to the unit by inserting the DC positive wire into the other + screw terminal and the DC return wire into the - screw terminal.

      The DeviceMaster will continue to operate if one of the two connected power supplies should fail.

      If you purchased the Comtrol power supply (separately), the wires are identified below:

      - Red = 6-30VDC positive
      - White = 6-30VDC return
      - Black = chassis ground

      If you did not purchase a power supply from Comtrol for the DeviceMaster, see 2-Port (DB9) Power Supply on Page 88 for power requirements.



   c. Use a small flat head screw driver to lock the wires into place.
   d. Verify that each wire has been tightened securely.
   e. Connect the power supply to a power source.

   Note: *Do not connect multiple units until you have changed the default IP address, see Initial Configuration on Page 33.*

4. Use the appropriate method for network attachment of your DeviceMaster 2-port:

   DeviceMaster **1E:** Connect the **10/100 port** to the same Ethernet network segment as the host PC using a standard network cable.

   DeviceMaster **2E:** Connect the DeviceMaster 2E using one of these methods:

   - **Ethernet hub, switch (10/100Base-T)**, **Server NIC (10/100Base-T)**: Connect a **10/100** port to the same Ethernet network segment as the host PC using a standard Ethernet cable.
   - **Daisy-chaining DeviceMaster units**: Connect the port labeled **E1** (or **E2**) on the first DeviceMaster to the port labeled **E1** (or **E2**) on the second DeviceMaster or other device using a standard Ethernet cable.

Do not connect RS-422/485 devices until the appropriate port interface type has been configured. The default port setting is RS-232.

5. Verify that the **Status** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the following table.

2-Port LED Descriptions	
STATUS	The **STATUS** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **STATUS** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
LINK	If the **LINK** (green) LED is lit, it indicates a working Ethernet connection.
ACT	If the **ACT** (yellow) LED flashes, it indicates network activity.
Note: *For additional LED information, go to the* **Status** *LED table on Page 97.*	

6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

4-Port and 8-Port Models

Use the following procedure to install the DeviceMaster 4-port or 8-port.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The MAC address (starts with **00 C0 4E**) and serial number are located on a label on the DeviceMaster.

   Note: *Do not connect multiple units until you have changed the default IP address, see* *Initial Configuration on Page 33*.

2. Optionally, attach the mounting brackets using the screws provided in the kit (6-32 1/4" flathead machine) or place the DeviceMaster on a stable surface.

   DeviceMaster RTS

   Larger Picture, Page 93

   Larger Picture, Page 93

   DeviceMaster PRO and
   DeviceMaster Serial Hub

   Larger Picture, Page 93

   Caution

   Failure to use the correct screws can damage the PCB and void the warranty. Do NOT use screws that exceed the length of the screws provided with the mounting bracket kit.

   Note: *If you ordered the DeviceMaster Rackmount Shelf Kit accessory, use the document that accompanied that kit or download the document to mount the DeviceMaster on the shelf.*

3. Connect the DeviceMaster to the same Ethernet network segment as the host PC using one of the following methods:

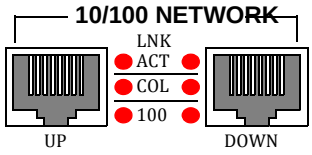
   - **Ethernet hub or switch (10/100Base-T)**: Connect to the port labeled **UP** on the DeviceMaster using a standard Ethernet cable.
   - **Server NIC (10/100Base-T)**: Connect to the port labeled **DOWN** on the DeviceMaster using a standard Ethernet cable.
   - **Daisy-chaining DeviceMaster units**: Connect the port labeled **DOWN** on the first DeviceMaster to the port labeled **UP** on the second DeviceMaster or other device using a standard Ethernet cable. Refer to Daisy-Chaining DeviceMaster 2E/4/8/16-Port Units on Page 101 for more detailed information.

   Caution

   Do not connect RS-422/485 devices until the appropriate port interface type has been configured. The default port setting is RS-232.

4. Apply power to the DeviceMaster by connecting the AC power adapter to the DeviceMaster, the appropriate power cord for your location to the power adapter, and plugging the power cord into a power source. If you want to provide your own power supply, see 4-Port Power Supply on Page 88.

5. Verify that the **PWR** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the table below.

<table>
<tr><th colspan="3">4-Port and 8-Port LED Descriptions</th></tr>
<tr><td>PWR</td><td colspan="2">LED on the front panel of the DeviceMaster is lit, indicating you have power and it has completed the boot cycle.
Note: The PWR LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.</td></tr>
<tr><td>LNK ACT</td><td>The red LNK ACT LED is lit, indicating that you have a working Ethernet connection.</td><td rowspan="3"> 
</td></tr>
<tr><td>COL</td><td>If the red COL LED is lit, there is a network collision.</td></tr>
<tr><td>100</td><td>If the red 100 LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.</td></tr>
<tr><td colspan="3">Note: For additional LED information, go to the PWR LED table on Page 97.</td></tr>
</table>

6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

16-Port (DeviceMaster RTS - External Power Supply)

Use the following procedure to install the DeviceMaster RTS 16-port with an external power supply.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The serial number and MAC address (starts with **00 C0 4E**) are located on a label on the DeviceMaster.

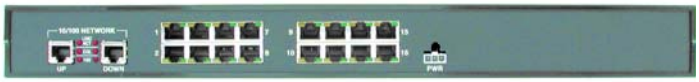
   Note: *Do not connect multiple units until you have changed the default IP address, see* *Initial Configuration on Page 33*.

2. Place the DeviceMaster RTS on a stable surface, or *optionally* mount the DeviceMaster in a rack.

   Rack Installation:

   a. Attach the L brackets to the interface using the screws supplied with the unit.

   b. You can mount the unit facing in either direction.



Larger picture, Page 94

   c. Attach the L bracket into your rack.

Caution

Follow these guidelines when mounting the DeviceMaster RTS in a rack.

- ***If the DeviceMaster is installed in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the DeviceMaster in an environment that is compatible with the maximum rated ambient temperature. See*** http://www.comtrol.com/products/specifications/99450-3 ***for temperature specifications.***
- ***Make sure that the mechanical loading is level to avoid a hazardous condition; such as, loading heavy equipment in the rack unevenly. The rack should safely support the combined weight of all equipment in the rack.***
- ***Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the DeviceMaster and to protect it from overheating, maintain a minimum of 1 inch of clearance on all sides of the unit.***
- ***AC power inputs are intended to be used with a three-wire grounding type plug, which has a grounding pin. Equipment grounding ensures safe operation. Do not defeat the grounding means and verify that the DeviceMaster is reliably grounded when mounting within the rack.***

3. Connect the DeviceMaster RTS to the same Ethernet network segment as the host PC using one of the following methods.

   - **Ethernet hub or switch (10/100Base-T)**: Connect to the port labeled **UP** on the DeviceMaster RTS using a standard Ethernet cable.
   - **Server NIC (10/100Base-T)**: Connect to the port labeled **DOWN** on the DeviceMaster RTS using a standard Ethernet cable.
   - **Daisy-chaining DeviceMaster units**: Connect the port labeled **DOWN** on the first DeviceMaster RTS to the port labeled **UP** on the second DeviceMaster or other device using a standard Ethernet cable.

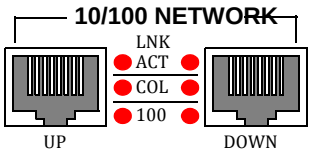
Caution

Do not connect RS-422/485 devices until the appropriate port interface type has been configured. The default port setting is RS-232.

4. Apply power to the DeviceMaster RTS by connecting the AC power adapter to the DeviceMaster, the power cord to the power adapter, and plugging the power cord into a power source. See External Power Supply Specifications on Page 87 if you want to provide your own power supply.

5. Verify that the **PWR** LED has completed the boot cycle and network connection for the DeviceMaster RTS is functioning properly using the table below.

DeviceMaster RTS 16-Port (External Power Supply) LED Descriptions	
Red LED	Red LED on the front panel of the DeviceMaster is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
LNK ACT	The red **LNK ACT** LED is lit, indicating that you have a working Ethernet connection.
COL	If the red **COL LED** is lit, there is a network collision.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Note: *For additional LED information, go to the PWR/Status LED table on Page 97.*	



6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

16-Port (DeviceMaster PRO)

Use the following procedure to install the DeviceMaster PRO 16-port with an external power supply.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The serial number and MAC address are located on a label on the device. The MAC address starts with **00 C0 4E**.

2. Place the DeviceMaster PRO on a stable surface, or *optionally* mount the DeviceMaster PRO in a rack.

   Rack Installation:

   a. Attach the L brackets to the interface using the screws supplied with the unit.

   b. You can mount the unit facing in either direction.

   c. Attach the L bracket into your rack.

   Follow these guidelines when mounting the DeviceMaster in a rack.

Caution

- ***If the DeviceMaster PRO is installed in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the DeviceMaster in an environment that is compatible with the maximum rated ambient temperature (http://www.comtrol.com/products/specifications/99451-0).***
- ***Make sure that the mechanical loading is level to avoid a hazardous condition; such as, loading heavy equipment in the rack unevenly. The rack should safely support the combined weight of all equipment in the rack.***
- ***Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the DeviceMaster and to protect it from overheating, maintain a minimum of 1 inch of clearance on all sides of the unit.***
- ***AC power inputs are intended to be used with a three-wire grounding type plug, which has a grounding pin. Equipment grounding ensures safe operation. Do not defeat the grounding means and verify that the DeviceMaster is reliably grounded when mounting within the rack.***

3. Connect the DeviceMaster PRO to the same Ethernet network segment as the host PC using one of the following methods.

   - **Ethernet hub or switch (10/100Base-T)**: Connect to the port labeled **UP** on the DeviceMaster PRO using a standard Ethernet cable.
   - **Server NIC (10/100Base-T)**: Connect to the port labeled **DOWN** on the DeviceMaster PRO using a standard Ethernet cable.
   - **Daisy-chaining DeviceMaster units**: Connect the port labeled **DOWN** on the first DeviceMaster PRO to the port labeled **UP** on the second DeviceMaster PRO or other device using a standard Ethernet cable.

     Note: *Do not connect multiple units until you have changed the default IP address, see* *Initial Configuration on Page 33*.

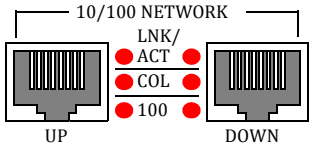
Caution

If you plan on using the NS-Link device driver, make sure that you do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The NS-Link default port setting is RS-232.

4. Connect the power cord into a power source.
5. Apply power to the DeviceMaster PRO by turning on the power switch.

6. Verify that the **PWR** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the table below.

DeviceMaster PRO 16-Port LED Description	
Red LED (Front panel)	Red LED on the front panel of the DeviceMaster PRO is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
LNK/ ACT	The red **LNK/ACT** LED is lit, indicating that you have a working Ethernet connection.
COL	If the red **COL LED** is lit, there is a network collision.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Note: *For additional LED information, go to the PWR/Status LED table on Page 97.*	



7. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

16/32-Port Rack Mount Models (Internal Power Supply)

Use the following procedure to install the DeviceMaster 16-port or 32-port with an internal power supply.

1. Record the MAC address and serial number of the DeviceMaster unit on the customer service label provided.

   You may need the MAC address during driver configuration. The serial number and MAC address (starts with **00 C0 4E**) are located on a label on the DeviceMaster.

   Note: *Do not connect multiple units until you have changed the default IP address, see* *Initial Configuration on Page 33*.

2. Place the DeviceMaster on a stable surface, or *optionally* mount the DeviceMaster in a rack.

   Rack Installation:

   a. Attach the L brackets to the interface using the screws supplied with the unit.

   b. You can mount the unit facing in either direction.

   c. Attach the L bracket into your rack.

Follow these guidelines when mounting the DeviceMaster in a rack.

Caution

- ***If the DeviceMaster is installed in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the DeviceMaster in an environment that is compatible with the maximum rated ambient temperature. Refer to the appropriate link for temperature specifications.***

  DeviceMaster RTS 16-port: http://www.comtrol.com/products/specifications/99455-8
  DeviceMaster RTS 32-port: http://www.comtrol.com/products/specifications/99456-5
  DeviceMaster Serial Hub: http://www.comtrol.com/products/specifications/99460-2

- ***Make sure that the mechanical loading is level to avoid a hazardous condition; such as, loading heavy equipment in the rack unevenly. The rack should safely support the combined weight of all equipment in the rack.***
- ***Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the DeviceMaster and to protect it from overheating, maintain a minimum of 1 inch of clearance on all sides of the unit.***
- ***AC power inputs are intended to be used with a three-wire grounding type plug, which has a grounding pin. Equipment grounding ensures safe operation. Do not defeat the grounding means and verify that the DeviceMaster is reliably grounded when mounting within the rack.***

3. Connect the DeviceMaster port labeled **10/100 NETWORK** to the same Ethernet network segment as the host PC using a standard network cable.

DeviceMaster RTS

Larger picture, *Page 94*

Larger picture, Page 94

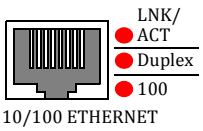
DeviceMaster Serial Hub

Larger picture, Page 94

Caution

If you plan on using the NS-Link device driver, make sure that you do not connect RS-422/485 devices until the appropriate port interface type has been configured in the driver. The NS-Link default port setting is RS-232.

4. Apply power to the DeviceMaster by connecting the appropriate power cord into the power socket on the DeviceMaster, plugging the power cord into a power source, and turning on the power switch.
5. Verify that the **Status** LED has completed the boot cycle and network connection for the DeviceMaster is functioning properly using the table below.

16/32-Port (Internal Power Supply) LED Descriptions		
Status	The amber **Status** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*	
LNK/ ACT	The red **LNK/ACT** LED is lit, indicating that you have a working Ethernet connection.	
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.	
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.	
Note: *For additional LED information, go to the* **Status** *LED table on Page 97.*		

6. Go to Initial Configuration on Page 33 for default network settings and how to configure the DeviceMaster for use.

Initial Configuration

There are several ways to configure network information. Comtrol Technical Support recommends connecting the DeviceMaster to a PC or laptop running Windows® and installing *PortVision Plus* for initial configuration.

This section shows you how to:

- Install PortVision Plus
- Configure the network address
- Check the SocketServer version on the DeviceMaster
- If necessary, download the latest version SocketServer and upload it into the DeviceMaster

If you do not want to install PortVision Plus, see RedBoot Procedures on Page 75 for alternate methods to configure the network or upload the latest firmware.

PortVision Plus Requirements

Use PortVision Plus to identify, configure, update, and manage the DeviceMaster on the following operating systems:

- Windows 2000
- Windows XP
- Windows Server 2003
- Windows Vista

PortVision Plus requires that you connect the DeviceMaster to the same network segment as the Windows system during the configuration process.

If you have a previous version of PortVision Plus on your system, use the *Control Panel* to remove PortVision Plus before installing the latest version.

Installing PortVision Plus

During initial configuration, PortVision Plus automatically detects and identifies DeviceMaster units, if they are in the same network segment by using the Scan Network button in PortVision Plus.

Use the *Software and Documentation* CD that came with the DeviceMaster to check for the latest version of PortVision Plus or use the link below to download the latest version.

1. Execute the **pvplus_[*version*].msi** file and follow the installation wizard using one of the following methods:
   - ***CD Installation***: Use the CD menu system to check the version on the CD against the latest released version.
   - ***Download the latest version***: http://www.comtrol.com/support/download.asp?partnumber=1800294.
2. Click **Launch** and **Finish** in the last installation screen.
3. Click **Scan** so that PortVision Plus locates the DeviceMaster.

   Note: *PortVision Plus locates all DeviceMaster models, including: the DeviceMaster 500, DeviceMaster AIR, DeviceMaster PRO, DeviceMaster RTS, DeviceMaster*

Serial Hub and DeviceMaster UP.

4. Go to Step 4 in the next section, *Configuring the Network Settings*, to program the DeviceMaster network settings.

If you need additional information about PortVision Plus, refer to the **Help** system.

Configuring the Network Settings

Default Network Settings

IP address:
192.168.250.250

Subnet mask:
255.255.0.0

Gateway address:
192.168.250.1

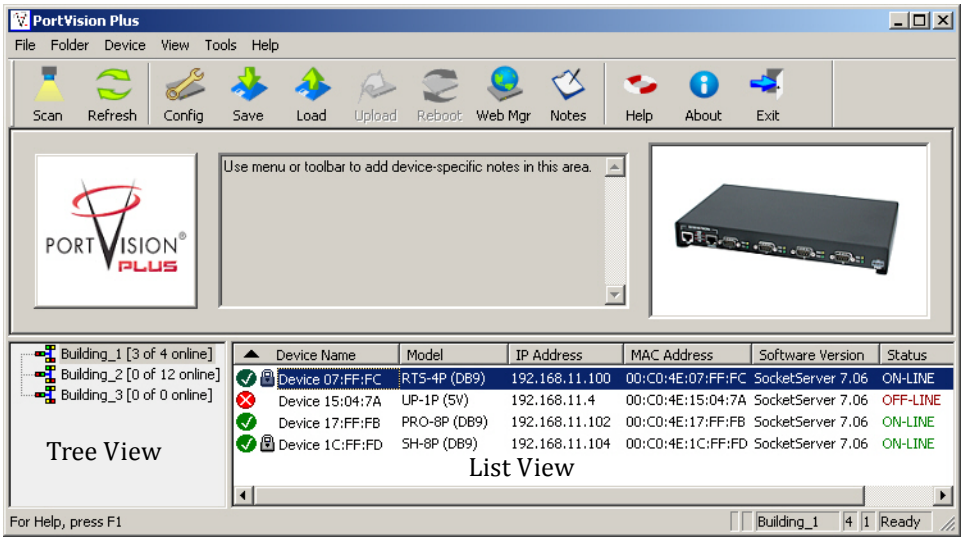
Use the following procedure to change the default network settings on the DeviceMaster for your network.

Note: *Technical Support advises configuring one new DeviceMaster at a time to avoid device driver configuration problems. If you want to configure multiple DeviceMasters using the* **Assign IP to Multiple Devices** *option, see* *Configuring Multiple DeviceMasters Network Addresses on Page 68*.

The following procedure shows how to configure a single DeviceMaster connected to the same network segment as the Windows system.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33).
2. Start PortVision Plus using the **PortVision Plus** desktop shortcut or from the **Start** button, click **Programs**, **Comtrol**, **PortVision Plus**.
3. If this is the first time you have opened PortVision Plus, click **Scan** and then **Yes** to locate DeviceMasters on the network.

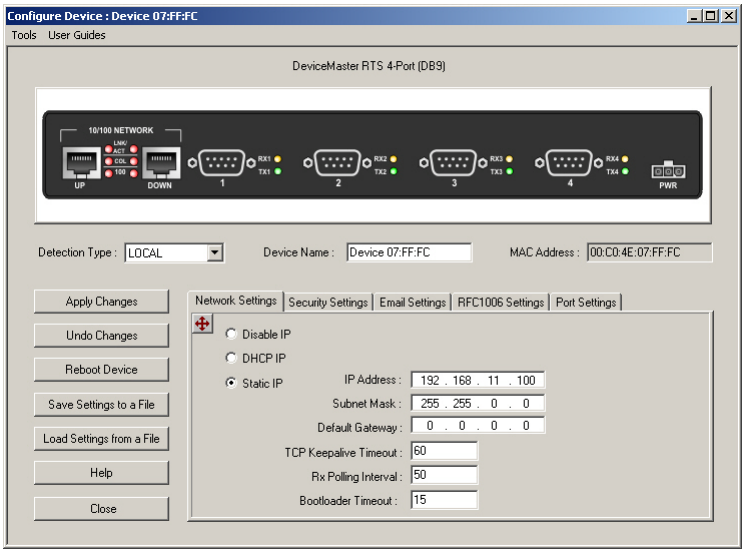
   Note: *PortVision Plus will locate all Comtrol DeviceMaster models, including: DeviceMaster 500. DeviceMaster AIR, DeviceMaster PRO, DeviceMaster RTS, DeviceMaster Serial Hub and DeviceMaster UP.*
4. Highlight the DeviceMaster for which you want to program network information and open the **Configure Device** screen using one of these methods.


PortVision Plus
File Folder Device View Tools Help
Scan Refresh Config Save Load Upload Reboot Web Mgr Notes Help About Exit
Use menu or toolbar to add device-specific notes in this area.
Building_1 [3 of 4 online]
Building_2 [0 of 12 online]
Building_3 [0 of 0 online]
Tree View
Device Name Model IP Address MAC Address Software Version Status
Device 07:FF:FC RTS-4P (DB9) 192.168.11.100 00:C0:4E:07:FF:FC SocketServer 7.06 ON-LINE
Device 15:04:7A UP-1P (5V) 192.168.11.4 00:C0:4E:15:04:7A SocketServer 7.06 OFF-LINE
Device 17:FF:FB PRO-8P (DB9) 192.168.11.102 00:C0:4E:17:FF:FB SocketServer 7.06 ON-LINE
Device 1C:FF:FD SH-8P (DB9) 192.168.11.104 00:C0:4E:1C:FF:FD SocketServer 7.06 ON-LINE
List View
For Help, press F1
Building_1
Ready

- Double-click the DeviceMaster in the *List View* pane.
- Click **Config**.
- Right-click the DeviceMaster in the *List View* pane and click **Configure Device**.

Note: *See the PortVision Plus Help system for information about using PortVision Plus.*

5. *Optionally*, rename the DeviceMaster in the **Device Name** field.



6. Change the DeviceMaster network properties as required for your site.
   - If you want to run the DeviceMaster using the MAC addressing scheme, click **Disable IP**.
   - To use the DeviceMaster with DHCP, click **DHCP IP**, and make sure that you provide the MAC address of the device to the network administrator. Make sure that the administrator reserves the IP address, subnet mask and gateway address of the DeviceMaster in the DHCP server.
   - To program a static IP address, click **Static IP** and enter the appropriate values for your site.

   Note: *For additional information, open the PortVision Plus Help system. Access the Help system using the Help button or go directly to the help for a specific property page by clicking the Context menu button* ( ).

7. Click **Apply Changes** to update the network information on the DeviceMaster.
8. *Optionally*, click **Save Settings to a File** to create a configuration file that you can use to configure other DeviceMasters.

   If you are deploying multiple DeviceMasters that share common values, you can save the configuration file and load that configuration onto other DeviceMasters.
9. Click **Close** to exit the *Configure Device* window.
10. Go to Checking the SocketServer Version on Page 36 to see if you need to update SocketServer before setting up the secure COM port redirector or configuring an environment for socket use only.

Checking the SocketServer Version

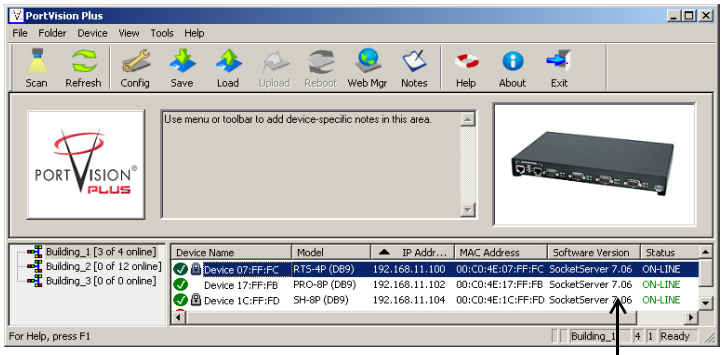
SocketServer refers to the web page that is integrated in the firmware that comes pre-installed on your DeviceMaster platform, which provides an interface to TCP/IP socket mode configuration and services.

Comtrol recommends verifying that your DeviceMaster contains the latest SocketServer version before setting up the secure COM port redirector or configuring socket ports to avoid installation problems.

Note: *It is not necessary to update SocketServer if you plan on using an NS-Link device driver.*

Use the following procedure to check the SocketServer version on the DeviceMaster.

1. If necessary, start PortVision Plus and scan the network.
2. Check the SocketServer version number of the *Software Version* for the DeviceMaster.


PortVision Plus
File Folder Device View Tools Help
Scan Refresh Config Save Load Upload Reboot Web Mgr Notes Help About Exit
Use menu or toolbar to add device-specific notes in this area.
Building_1 [3 of 4 online]
Building_2 [0 of 12 online]
Building_3 [0 of 0 online]
Device Name Model IP Addr... MAC Address Software Version Status
Device 07:FF:FC RTS-4P (DB9) 192.168.11.100 00:C0:4E:07:FF:FC SocketServer 7.06 ON-LINE
Device 17:FF:FB PRO-8P (DB9) 192.168.11.102 00:C0:4E:17:FF:FB SocketServer 7.06 ON-LINE
Device 1C:FF:FD SH-8P (DB9) 192.168.11.104 00:C0:4E:1C:FF:FD SocketServer 7.06 ON-LINE
For Help, press F1
Ready

Version number

3. Check the Comtrol web site to see if a later version is available.
4. If the version on the web site is later than the version on the DeviceMaster, download the file and then go to Uploading SocketServer on Page 37.

   If the SocketServer version on the DeviceMaster is current, you are ready to start setting up the secure COM ports redirector or to configure the sockets using the SocketServer web page. Use the appropriate discussion to complete the DeviceMaster configuration process.

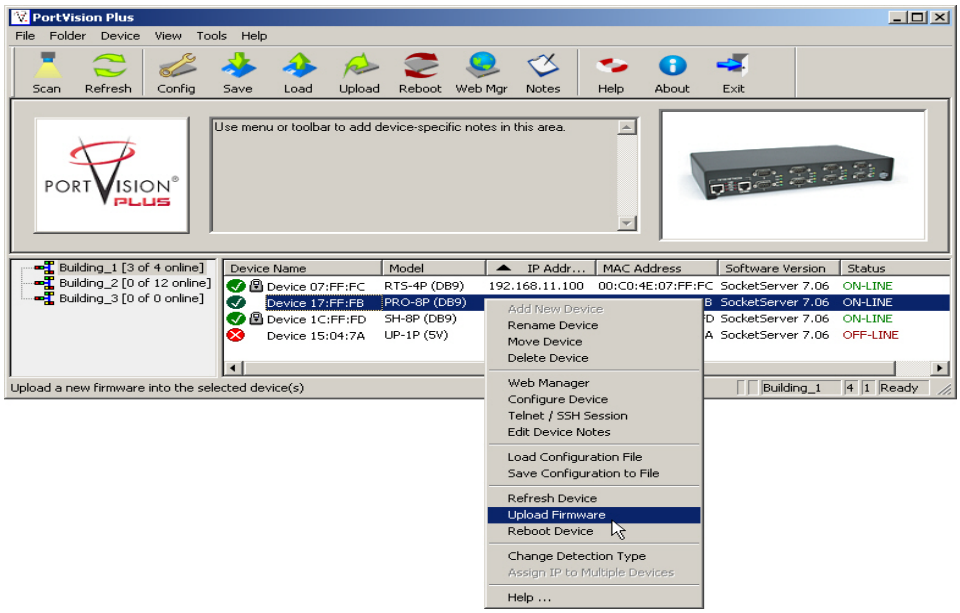
   - Secure COM Port Set Up on Page 45
   - Socket Port Configuration on Page 49

Uploading SocketServer

Use this section to upload a new version of SocketServer on the DeviceMaster using PortVision Plus. Technical Support recommends updating SocketServer before setting up the secure COM ports redirector or to configure the sockets using the SocketServer web page to avoid configuration problems.

Note: *This section contains SocketServer update information for installations that are **NOT** running an NS-Link driver. If you are running an NS-Link device driver, see the NS-Link User Guide for Windows (also available on the CD).*

1. Make sure that you have located or downloaded the latest SocketServer version.
2. Right-click the DeviceMaster for which you want to update, click **Upload Firmware**, browse to the SocketServer **.bin** file, and then click **Open**.


PortVision Plus
File Folder Device View Tools Help
Scan Refresh Config Save Load Upload Reboot Web Mgr Notes Help About Exit
Use menu or toolbar to add device-specific notes in this area.
Building_1 [3 of 4 online]
Building_2 [0 of 12 online]
Building_3 [0 of 0 online]
Device Name Model IP Addr... MAC Address Software Version Status
Device 07:FF:FC RTS-4P (DB9) 192.168.11.100 00:C0:4E:07:FF:FC SocketServer 7.06 ON-LINE
Device 17:FF:FB PRO-8P (DB9)
Device 1C:FF:FD SH-8P (DB9) SocketServer 7.06 ON-LINE
Device 15:04:7A UP-1P (5V) SocketServer 7.06 OFF-LINE
Add New Device
Rename Device
Move Device
Delete Device
Web Manager
Configure Device
Telnet / SSH Session
Edit Device Notes
Load Configuration File
Save Configuration to File
Refresh Device
Upload Firmware
Reboot Device
Change Detection Type
Assign IP to Multiple Devices
Help ...
Upload a new firmware into the selected device(s)
Building_1
Ready

3. Click **Yes** to the *Upload Firmware* message that warns you that this is a sensitive process.

   It may take a few moments for the firmware to upload onto the device. The device will reboot itself during the upload process.

4. Click **Ok** to the advisory message about waiting to use the device until the status reads **ON-LINE**. In the next polling cycle, PortVision Plus updates the *List View* pane and displays the new SocketServer version.

You are now ready to complete the DeviceMaster configuration by setting up the secure COM port redirector or configuring sockets using the SocketServer web page, depending on your environment.

Go to Secure COM Port Set Up on Page 45 to locate information about setting up secure COM ports.

If you do not plan on setting up secure COM portsNS-Link, go to Socket Port Configuration on Page 49 for information about configuring sockets using the SocketServer web page.

Device Driver Installation

Before installing the NS-Link device driver, the following conditions must be met:

- The DeviceMaster is connected to the network and powered on (Hardware Installation on Page 13)
- The network information has been configured in the DeviceMaster (Configuring the Network Settings on Page 34)
- If this is the *initial* device driver installation, verify that the DeviceMaster contains the latest version of SocketServer (Checking the SocketServer Version on Page 36)

After NS-Link driver installation and configuration, the same ports can be configured as TCP/IP sockets using an NS-Link version of the SocketServer web page (Socket Port Configuration on Page 49).

Linux Installation

Refer to the **README** file provided with the Linux® driver for installation and configuration procedures. Locate the latest device driver for Linux:

- ***CD Installation***: Use the CD to check the driver version on the CD against the latest released version. Open the **/html/default.htm** file to use the menu system.
- ***Download the latest device driver***: http://www.comtrol.com/support/download.asp?partnumber=1800026.

Windows Installation

This subsection provides an installation overview for the NS-Link device driver for the Windows 2000, Windows XP, Windows Server 2003, and Window Vista operating systems.

Note: *If you require secure COM ports, go to Secure COM Port Set Up on Page 45. You do not need to install the NS-Link device driver if you plan on configuring secure COM ports.*

1. Locate the latest device driver for Windows and *NS-Link User Guide for Windows*:
   - ***CD Installation***: You can use the CD to check the driver version on the CD against the latest released version.
   - ***Download the latest device driver***: http://www.comtrol.com/support/download.asp?partnumber=1800288.
   - ***Download the latest NS-Link User Guide for Windows***, which contains detailed installation and configuration information or procedures to update an existing installation: http://www.comtrol.com/support/download.asp?partnumber=2000339
2. Unzip the driver assembly.

3. Go to the appropriate procedure to install the driver. The device driver for Windows installation follows these steps for each DeviceMaster. If you have multiple DeviceMasters, you must repeat this process for each DeviceMaster.
   - Windows Vista: NS-Link Installation on Page 40
   - Windows XP and Windows Server 2003: NS-Link Installation on Page 41
   - Windows 2000: NS-Link Installation on Page 42

Windows Vista: NS-Link Installation

After locating the latest driver (Page 39) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster.

1. From the **Start** button, click **Settings**, **Control Panel** and then double-click **Add Hardware**.
2. Click **Next** when the *Add Hardware* wizard starts.
3. Click **Install the hardware that I manually select from a list (Advanced)** and **Next**.
4. Highlight **Multi-port serial adapters** and then click **Next**.
5. Click **Have Disk**, **Browse** and locate the unzipped driver files, click **Open** and then click **OK**.

   Note: *Select any* **.inf** *file and the driver executes the appropriate file for your DeviceMaster installation.*
6. Highlight the DeviceMaster in the **Models** list and click **Next**.
7. Click **Next** to start the driver installation.
8. If necessary, click **Install this driver software anyway** at the prompts to proceed for the DeviceMaster and first port.

   Note: *It may take up to several moments for the operating system to load the driver on the first port.*
9. Click **Finish** to complete this part of the installation process.
10. At the *Windows needs to install driver software for your Comtrol NS-Link Port*, click **Locate and install driver software automatically (Recommended)** and **Next**.
11. If necessary, click **Install this driver software anyway** to proceed.
12. Click **Close** when *The software for this device has been successfully installed screen* appears and close the *Control Panel*.
13. Go to Configuring the NS-Link Driver for Windows on Page 43 to begin NS-Link driver configuration.

If you are installing multiple DeviceMaster, repeat this procedure for each DeviceMaster.

Windows XP and Windows Server 2003: NS-Link Installation

After locating the latest driver (Page 39) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster.

1. From the **Start** button, click **Control Panel** and then double-click **Add Hardware**.
2. Click **Next** when the *Add Hardware Wizard* starts.
3. Click **Yes, I have already connected the hardware** and then **Next**.
4. Highlight **Add a new hardware device** (at the bottom of the list) and click **Next**.
5. Click **Install the hardware that I manually select from a list (Advanced)** and **Next**.
6. Highlight **Multi-port serial adapters** and then click **Next**.
7. Click **Have Disk**, **Browse** and locate the unzipped driver files, click **Open** and then click **OK**.

   Note: *You do not need to select a specific* **.inf** *file, the driver uses the appropriate file for your DeviceMaster installation.*
8. Highlight the DeviceMaster in the **Models** list and click **Next**.
9. Click **Next** to start the driver installation.
10. If necessary, click **Continue Anyway** to proceed for the DeviceMaster and the first port.

    Note: *It may take up to several moments for the operating system to load the driver on the first port.*
11. Click **Finish** to complete this part of the installation process for the DeviceMaster.
12. Click **Install the software automatically (Recommended)** and then click **Next**.
13. If necessary, click **Continue Anyway** to proceed.
14. Click **Finish** to complete the driver installation process for this port.

    Note: *You may need to wait a few moments while the operating system creates a port for the DeviceMaster.*
15. Repeat Steps 12 through 14 for each remaining port on the DeviceMaster.
16. If Windows XP, close the *Control Panel*.
17. Go to Configuring the NS-Link Driver for Windows on Page 43 to begin NS-Link driver configuration.

If you are installing multiple DeviceMaster, repeat this procedure for each DeviceMaster.

Windows 2000: NS-Link Installation

After locating the latest driver (Page 39) and extracting the files, use this procedure to install and configure the NS-Link device driver for your DeviceMaster.

1. Click **Start**, **Settings**, and **Control Panel**, and then double-click **Add/Remove Hardware**.
2. Click **Next**.
3. Click **Add/Troubleshoot a device** and then **Next**.
4. Highlight **Add a new device** and click **Next**.
5. Click **No, I want to select the hardware from a list** and then **Next**.
6. Click **Multi-port serial adapters** and select then **Next**.
7. Click **Have Disk**, **Browse** to locate the unzipped installation files or enter the path, and then click **Ok**.

   For example, if you extracted the driver to the default subdirectory, enter: **C:\Comtrol**.

   Note: *You do not need to select a specific* **.inf** *file, the driver uses the appropriate file for your DeviceMaster installation.*
8. From the **Models** list, highlight the DeviceMaster and click **Next**.
9. Click **Next** to start the driver installation.
10. Click **Yes** to continue the installation.

    Note: *It may take up to several moments for Windows 2000 to load the driver for each port on the DeviceMaster. A Found New Hardware message will display for each port on the DeviceMaster.*
11. Click **Finish** to complete the driver installation process for this port.
12. Close the *Control Panel*.
13. Go to Configuring the NS-Link Driver for Windows on Page 43 to begin NS-Link driver configuration.

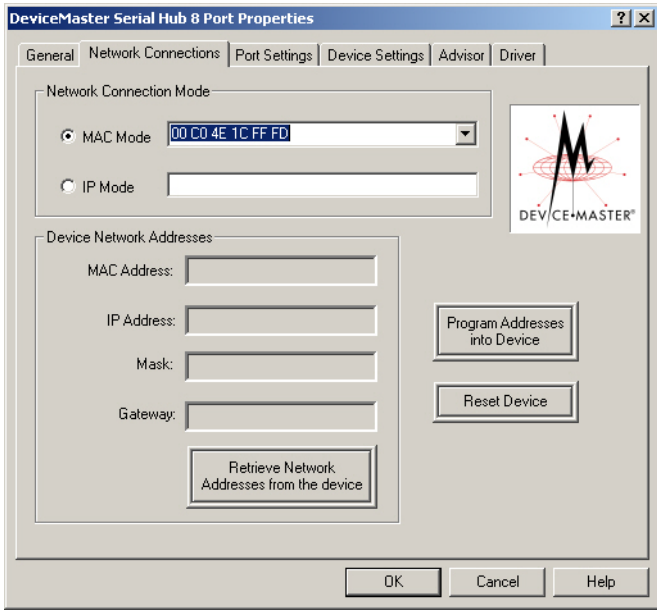
If you are installing multiple DeviceMaster, repeat this procedure for each DeviceMaster.

Configuring the NS-Link Driver for Windows

The DeviceMaster must be connected to the local network segment or directly to a NIC on the host system to operate in MAC mode to perform the following procedure.

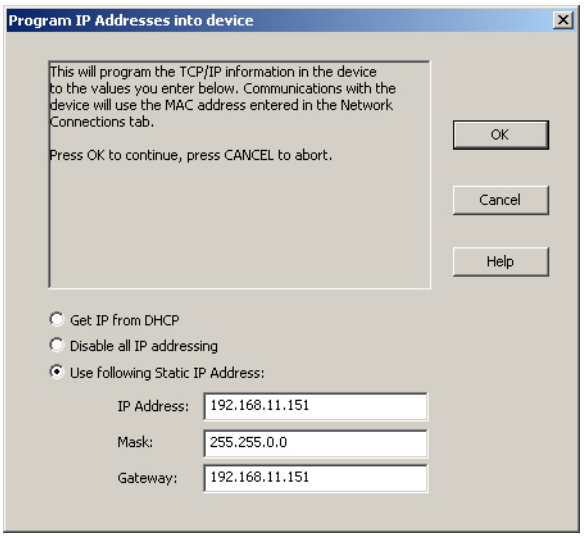
1. Access the *Properties* page for the DeviceMaster.
   a. Right-click **My Computer** or **Computer**, click **Manage**, and then highlight **Device Manager**.
   b. Expand the **Multi-port serial adapters** entry, right-click the DeviceMaster you want to configure, and then click **Properties**.
2. Click the **Network Connections** tab.
3. Enter the address from the MAC address label on the DeviceMaster or select the MAC address from the drop list.

   Note: *If you enter the MAC address, make sure that you use the correct format:* **00 C0 4E xx xx xx**. *A space must separate each pair of digits.*



4. Click **OK** to program the driver with the MAC address of the DeviceMaster.

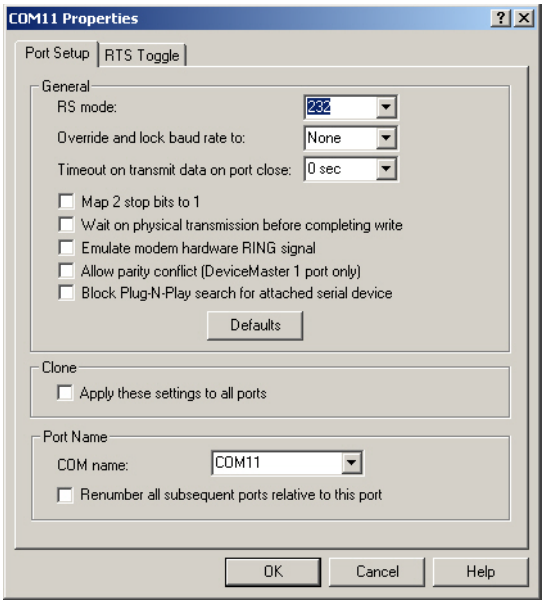
   The **Properties** page closes automatically.
5. Re-open the *Properties* page for the DeviceMaster and select the **Network Connections** tab.
6. Click **Program Addresses into Device**.
7. Click the appropriate addressing method in the *Program IP Address into Device* dialog for your environment and click **Ok**.
8. To run the driver using an IP address, click **IP Mode** in the *Network Connection Mode* group and **Ok** when you are returned to the **Network Connections** tab.
9. Go to the next subsection to configure the COM port properties.


Program IP Addresses into device
This will program the TCP/IP information in the device to the values you enter below. Communications with the device will use the MAC address entered in the Network Connections tab.
Press OK to continue, press CANCEL to abort.
OK
Cancel
Help
Get IP from DHCP
Disable all IP addressing
Use following Static IP Address:
IP Address:
192.168.11.151
Mask:
255.255.0.0
Gateway:
192.168.11.151

Configuring COM Port Properties for Windows

The following is a COM port properties configuration overview. Use the NS-Link User Guide for Windows (also available on the CD) or the NS-Link **Help** system for detailed configuration information.

1. Access the *Properties* page for the DeviceMaster.
   a. Right-click **My Computer** or **Computer**, click **Manage**, and then highlight **Device Manager**.
   b. Expand the **Multi-port serial adapters** entry, right-click the DeviceMaster you want to configure, and then click **Properties**.
2. Click the **Port Setting** tab.
3. Highlight the **COM port** that you want to configure and click **Properties**.
4. Complete the screen appropriately for the serial device that you plan on connecting to the port and click **Ok**.
5. If necessary, click the **Device Settings** tab to change the default device settings. See the NS-Link help system or the *NS-Link User Guide* for information.
6. Click **Ok** to close the DeviceMaster property page.
7. Close the *Device Manager*.
8. Refer to on Page 44 or Connecting Serial Devices on Page 53 to attach your serial device.



Secure COM Port Set Up

Before configuring security and installing the secure COM port redirector, the following conditions must be met:

- The DeviceMaster is connected to the network and powered on (Hardware Installation on Page 13)
- The network information has been configured in the DeviceMaster (Configuring the Network Settings on Page 34)
- If this is the initial device driver installation, verify that the DeviceMaster contains the latest version of SocketServer (Checking the SocketServer Version on Page 36)

Secure COM Port Redirector Overview

If you require secure COM ports, you will need to do the following to set up secure COM ports on the DeviceMaster.

- Configure the serial port characteristics and enable the security feature in the SocketServer web page
- Install the secure COM port redirector
- Add and configure the DeviceMaster serial port with the secure port redirector

If your site does not require security and you want to configure COM ports, you should install the NS-Link device driver.

Configuring Serial Ports and Enabling Security

The first step to setting up a secure connection on the DeviceMaster is to use SocketServer to enable the appropriate port or ports and configure DeviceMaster security.

Note: *Make sure that the DeviceMaster contains the latest version of SocketServer before setting up security on the DeviceMaster.*

1. Open the DeviceMaster *Server Configuration* page using one of these methods:
   - Web browser, open a web browser and enter the IP address of the DeviceMaster that you want to configure.
   - PortVision Plus, start PortVision PlusPortVision Plus, right-click the DeviceMaster that you want to configure, and click **Web Manager**.
2. Click the port for which you want to configure.

   Note: *Click the ? in a configuration area for field specific information or the Help button at the bottom of the page to view page level help.*
3. If connecting an RS-422 or RS-485 serial device to this port, select the appropriate setting from the *Mode* drop list.
4. If necessary, set additional *Serial Configuration* parameters to match your serial device.
5. Click **Enable** in *TCP Connection Configuration*.
6. Optionally, click **Clone** if you want to set up all of the DeviceMaster serial ports with the same serial characteristics.

   Note: *You will need the DeviceMaster IP address and the TCP port number to if you*

want to configure the secure COM port redirector.

7. Click **Save**.
8. Click **Ok** at the *Configuration Updated* page.
9. Click **Configure Security**.
10. Click **Enable Secure Data Mode** so that TCP connections that carry data to/from the serial ports are encrypted using SSL or TLS security protocols. If this is enabled the following DeviceMaster features are disabled:
    - The Comtrol proprietary MAC mode Ethernet driver protocol used in NS-Link and both UDP and MAC mode serial data transport
    - The e-mail feature in SocketServer
    - The RFC1006 features in SocketServer
11. Click **Enable Secure Config Mode** if you want to provide this level of security, which disables the following features:
    - Telnet access to administrative and diagnostic functions is disabled.
    - SSH access is still allowed.
    - Unencrypted access to the web server via port 80 (http:// URLs) is disabled. Encrypted access to the web server via port 443 (https:// URLs) is still allowed.
    - Administrative commands that change configuration or operating state which are received using the Comtrol proprietary TCP driver protocol on TCP port 4606 are ignored.
    - Administrative commands that change configuration or operating state that are received using the Comtrol MAC mode proprietary Ethernet protocol number 0x11FE are ignored.
12. If necessary, click **Enable Telnet/ssh**.
13. If required, click **Set** to configure *RSA key pair* used by SSL and SSH servers.

    This is used to sign the Server RSA Certificate in order to verify that the DeviceMaster is authorized to use the server RSA identity certificate. Possession of the private portion of this key pair allows somebody to pose as the DeviceMaster If the Server RSA Key is to be replaced, a corresponding RSA identity certificate must also be generated and uploaded or clients are not able to verify the identity certificate.

    a. Click **Browse** to locate the server RSA key.

    b. Click **Upload**.
14. If required, click **Set** to configure the *RSA identity certificate* that the DeviceMaster uses during SSL/TLS handshaking to identify itself.

    It is used most frequently by SSL server code in the DeviceMaster when clients open connections to the DeviceMaster's secure web server or other secure TCP ports. If a DeviceMaster serial port configuration is set up to open (as a client) a TCP connection to another server device, the DeviceMaster also uses this certificate to identify itself as an SSL client if requested by the server.

    In order to function properly, this certificate must be signed using the Server RSA Key. This means that the server RSA certificate and server RSA key must be replaced as a pair.

    a. Click **Browse** to locate the RSA server certificate.

    b. Click **Upload**.
15. If required, click **Set** to enter the *private/public key pair* that is used by some cipher suites to encrypt the SSL/TLS handshaking messages. Possession of the private portion of the key pair allows an eavesdropper to decrypt traffic on SSL/TLS connections that use DH encryption during handshaking.
16. If required, click **Set** to upload the *Client Authentication Certificate*.

If a CA certificate is uploaded, the DeviceMaster only allows SSL/TLS connections from client applications that provide to the DeviceMaster an identity certificate that has been signed by the CA certificate that was uploaded to the DeviceMaster.

This uploaded CA certificate that is used to validate a client's identity is sometimes referred to as a “trusted root certificate”, a “trusted authority certificate”, or a “trusted CA certificate”. This CA certificate might be that of a trusted commercial certificate authority or it may be a privately generated certificate that an organization creates internally to provide a mechanism to control access to resources that are protected by the SSL/TLS protocols.

To control access to the DeviceMaster's SSL/TLS protected resources you should create your own custom CA certificate and then configure authorized client applications with identity certificates signed by the custom CA certificate.

a. Click **Browse** to locate the *Client Authentication Certificate*.

b. Click **Upload**.

17. After completing the key and certification management, click **Save**.
18. To configure another port as a secure COM port, update the *Serial Configuration* (Step 2).
19. Click **Reboot** for the changes to take affect.
20. If you want to configure a secure COM port, you are ready to install the secure port redirector using the *Installing the Secure COM Port Redirector* subsection.

Installing the Secure COM Port Redirector

You can refer to the help system in the secure COM port redirector or use the following procedure to install the secure port redirector for Windows.

1. Locate the secure COM port redirector on the CD or download the latest version.
2. Double-click the **setup-spr.msi** file.
3. Click **Next** at the *Setup Wizard*.
4. Click **I accept the terms in the License Agreement** and **Next**.
5. Optionally, browse and select a different installation path and then click **Next**.
6. Verify the installation selections and then click **Install**.
7. Click **Finish** to complete the installation and open the secure port redirector.
8. Configure the port with the secure port redirector using the next subsection.

Configuring Secure Redirector COM Ports

Use the following procedures to:

- Add a DeviceMaster port
- Configure the port for the secure port redirector

If necessary, refer to the secure port redirector help system for more information.

Adding a Secure Port

Use the following procedure to add a secure port or ports.

Note: *You must have enabled the security feature in SocketServer and have the IP address and TCP port numbers to perform the following procedure.*

1. If necessary, open the *Secure Port Redirector*, click **Start**, **Programs**, **Secure Port Redirector**, and **Secure Port Redirector**.
2. Click **Port** and **Add**.
3. Select an available COM port in the *Virtual serial port* drop list.
4. Enter the Remote IP address of the DeviceMaster.
5. Enter the TCP port number for which you want to communicate on the DeviceMaster.
6. Click **Ok**.
7. Repeat Step 2 for each port that you want to use as a secure COM port.

Configuring the Secure COM Port

Use the following procedure to configure the port.

1. Double-click the port that you want to configure.
2. Optionally click the *Connection Settings* tab and then click **Auto-reconnect when connection is broken**.
3. Click the *SSL Security* tab and then click **Use SSL for connection to remote side**.
4. Click the *Settings* tab and select the appropriate serial port settings.
5. Optional click the *Extra Strings* tab and enter the appropriate values.
6. Click **OK** to save the settings for the DeviceMaster.
7. Repeat the above procedure for each port that you want to use as a secure COM port.

You are now ready to connect the serial devices to the DeviceMaster ports. If necessary, refer to Connecting Serial Devices on Page 53 for cabling information.

Socket Port Configuration

This section discusses the following topics:

- *SocketServer Overview*
- SocketServer Versions on Page 52
- Accessing Socket Configuration on Page 51

SocketServer Overview

SocketServer is the name of the TCP/IP socket web page that is integrated in the firmware that comes pre-installed on your DeviceMaster.

If you want to use any of the ports as COM or tty ports, you should first install and configure the NS-Link device driver for your operating system, and then configure the ports that you want to use as TCP/IP sockets. When you install an NS-Link device driver, an NS-Link version of SocketServer loads on the DeviceMaster. See Device Driver Installation on Page 39 for device driver installation procedures.

The main SocketServer web page provides access to configure:

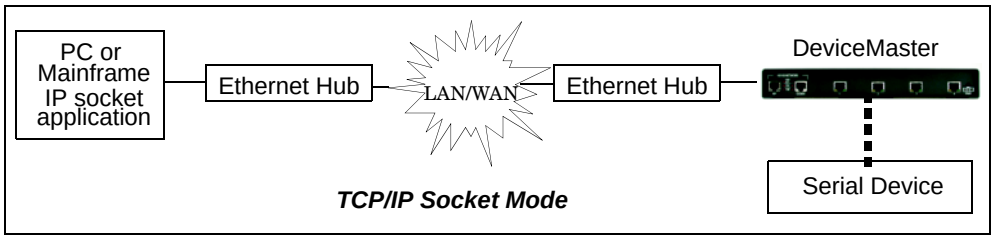
- Socket port characteristics for:
  - Serial
  - TCP connection
  - UDP connection

  See SocketServer Architecture on Page 50 for more information about socket port support.
- Network settings (after initial configuration)
- Email notification services
- RFC1006 (ISO over TCP)

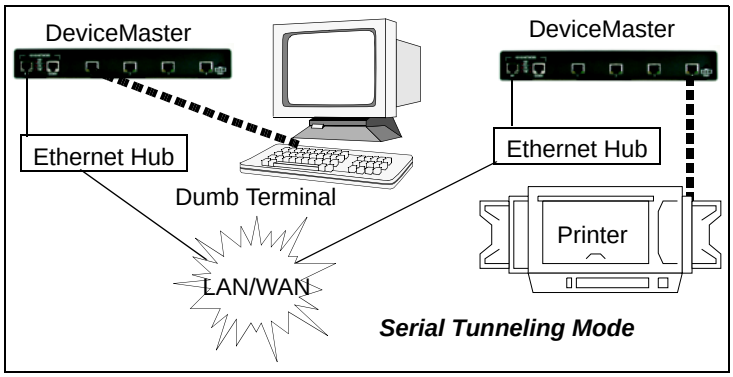
Note: *For socket service configuration procedures, see the web page Help system or the PortVision Plus Help system.*

SocketServer Architecture

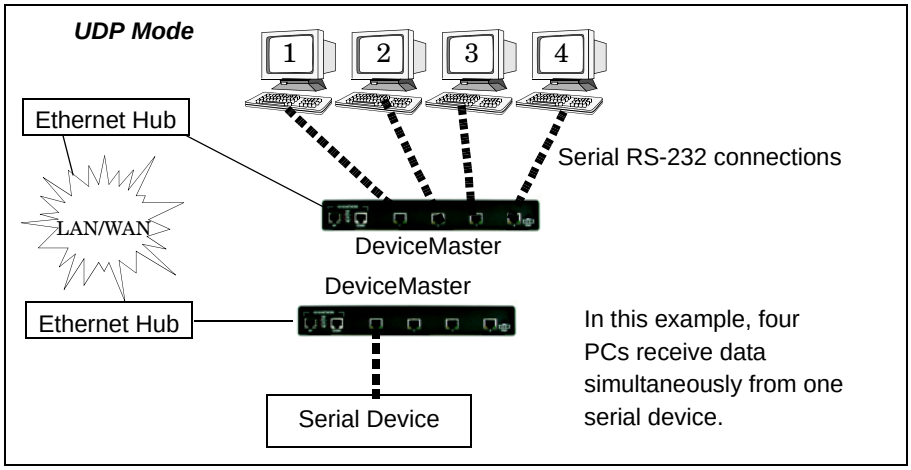
TCP/IP socket mode operation is used to connect serial devices with an application that supports TCP/IP socket communications addressing.



Serial tunneling mode is used to establish a socket connection between two DeviceMasters through an ethernet network.



UDP mode is designed for applications that need faster data transmission, or that make use of UDP's broadcast capabilities. UDP differs from TCP in that a UDP transmission does not first require a connection to be opened before sending data and the receiving device does not issue acknowledgements to the sender.



Accessing Socket Configuration

There are several ways to access the socket configuration pages (SocketServer or NS-Link). Use the method that fits your environment best.

- *Web Browser*
- *PortVision Plus*

Web Browser

To access the socket configuration page for the DeviceMaster using a web browser, follow this procedure.

1. Start your web browser.
2. Enter the IP address of the DeviceMaster in the URL field.

   Note: *If you do not know the IP address, you can view the IP address in PortVision Plus or retrieve the IP address with the NS-Link driver for Windows.*

3. Click the port number that you want to configure as a socket.

Note: *See the web page Help system, if you need information about configuring sockets or serial tunneling. The Help system provides detailed configuration procedures and descriptions for all fields.*

PortVision Plus

There are several ways to access the socket configuration page for the DeviceMaster using PortVision Plus.

Web Manager Button

1. If necessary, start PortVision Plus, right-click the DeviceMaster that you want to configure, and click **Web Manager**.
2. Click the port for which you want to configure socket port settings (serial, TCP connection configuration, and UDP connection configuration).

   Note: *For socket configuration information see the Help system. Click the* **?** *in a configuration area for field specific information or the Help button at the bottom of the page to view page level help. To locate configuration procedures, scroll to the top of the Help file and view the Table of Contents.*

3. Click **Save** to return to the main page.
4. Optionally, access the following pages to configure additional settings.
   a. Click the **Network** page to change the network settings.
   b. Click the **Email Settings** page to configure email notification services.
   c. Click the **RFC1006 Settings** page to configure RFC1006 settings.

Configure Device Page

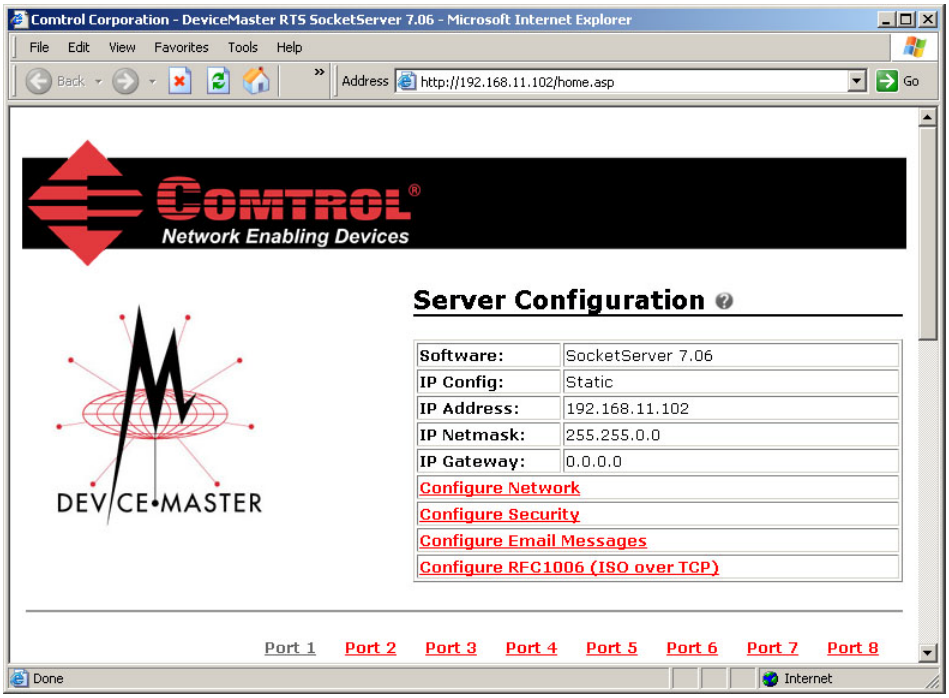
1. If necessary, start PortVision Plus, double-click the DeviceMaster that you want to configure in the *List View* pane.
2. Click the port **Settings tab** to configure socket port settings (serial, TCP connection configuration, and UDP connection configuration).

   Note: *For socket configuration information click the Help button at the left.*

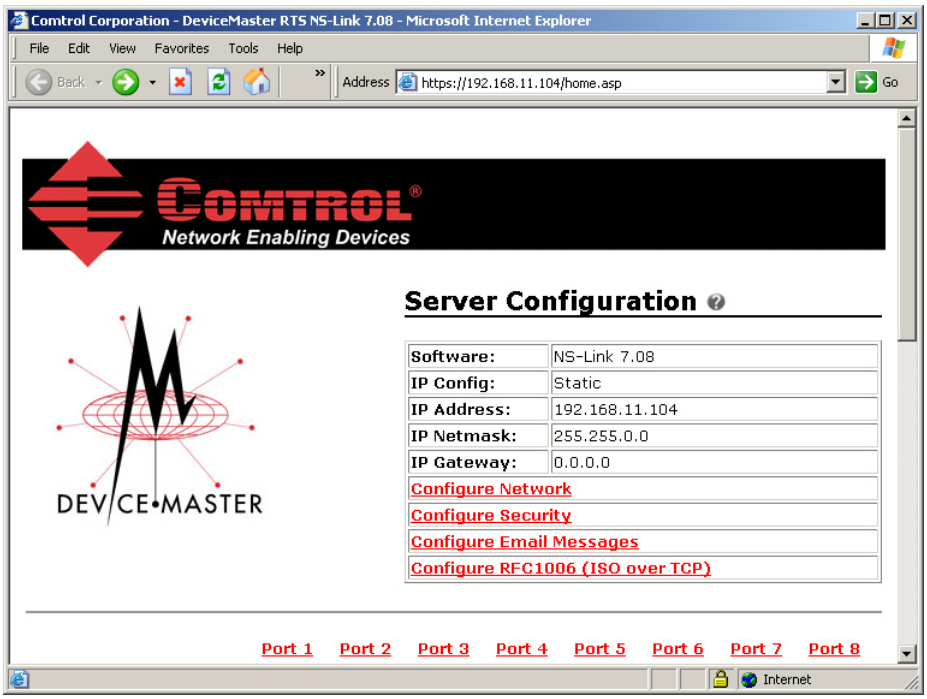
3. Optionally, access the following pages to configure additional settings.
   a. Click the **Email Settings** property page to configure email notification services.
   b. Click the **RFC1006 Settings** property page to configure RFC1006 settings.
   c. Click the **Port Settings** property page to configure serial port characteristics for socket services.

SocketServer Versions

The SocketServer Overview discusses the that the default SocketServer web page is the same as the NS-Link web page. If the NS-Link driver is not running (not installed or disabled), the default SocketServer loads when you open a web browser session.



Your SocketServer or NS-Link version may be different than these examples.



Connecting Serial Devices

This section discusses connecting your serial devices to the DeviceMaster. In addition, it provides you with information to build serial or test cables and loopback connectors to test the serial ports.

Note: *Go to Building the Serial Ribbon Cable on Page 16 for connector information for the DeviceMaster 1-Port Embedded adapter.*

Connecting Devices

Use the appropriate procedure to connect asynchronous serial devices to the DeviceMaster ports.

Make sure that you have configured the ports using the NS-Link driver or SocketServer for the correct communications mode before connecting any devices. The default mode in the NS-Link drivers is RS-232. There is a remote possibility that connecting a serial device for the wrong mode could damage the serial device.

- DeviceMaster 1/4/8/16/32-Port Models
- DeviceMaster 2-Port with Serial Terminals on Page 56
- DeviceMaster 2-Port with Serial Terminals on Page 56

DeviceMaster 1/4/8/16/32-Port Models

1. Connect your serial devices to the appropriate serial port on the DeviceMaster using the appropriate cable. You can build your own DB9 or RJ45 cables using the appropriate discussion:.
   - DB9 Serial Cables and Loopback Plugs on Page 59
   - RJ45 Serial Cables and Loopback Plugs on Page 61

   Note: *Refer to the hardware manufacturer's installation documentation if you need help with connector pinouts or cabling for the serial device.*
2. Verify that the devices are communicating properly. Go to the appropriate table for information about the LEDs, which may provide information about the installation.
   - 1-Port (Standard) LEDs on Page 54
   - 1-Port Embedded LEDs on Page 54
   - LEDs - 4/8-Port with DB9 Connectors on Page 54
   - LEDs - 8/16/32-Port with RJ45 Connectors on Page 55

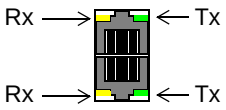
For additional LED information, go to the **PWR** or **Status** LED table on Page 97.

1-Port (Standard) LEDs	
Status	The amber **Status** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
Link Act	If the red **Link Act** LED is lit, it indicates a working Ethernet connection.
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.
100	If the red **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

1-Port Embedded LEDs	
Status	When lit, the amber **Status** LED (**D1**) on the DeviceMaster indicates the devices is fully powered and has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
Link/ Act	When lit, the red **Link/Act** LED (**D2**) indicates a working Ethernet connection.
Duplex	When lit, the red **Duplex** (**D3**) LED indicates full-duplex activity.
100	When lit, the red **100** (**D4**) LED indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.

LEDs - 4/8-Port with DB9 Connectors	
LINK ACT	If the **LINK ACT** LED (UP or DOWN) is lit, it indicates a working Ethernet connection.
COL	If the **COL** LED is lit, it indicates a network collision.
100	If the **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Rx/Tx	The **Rx** (amber) and **Tx** (green) LEDs next to each port provides information about the network connection of the serial port. * Represents port number.
PWR	When lit, the **PWR** LED (reverse side from the serial connectors) on the DeviceMaster indicates the devices is fully powered and has completed the boot cycle. ***Note:*** *The* **PWR** *LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*

LEDs - DeviceMaster Serial Hub 16-Port with DB9 Connectors	
LINK ACT	If the **LINK ACT** LED (UP or DOWN) is lit, it indicates a working Ethernet connection.
100	When lit, the red **100** (**D4**) LED indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Duplex	If the red **Duplex** LED is lit, it indicates full-duplex activity.
Rx/Tx	The Rx (amber) and Tx (green) LEDs next to each port provides information about the network connection of the serial port. * Represents port number.
Status	When lit, the **Status** LED (reverse side from the serial connectors) on the DeviceMaster Serial Hub indicates the devices is fully powered and has completed the boot cycle. ***Note:*** *The* **Status** *LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*

LEDs - 8/16/32-Port with RJ45 Connectors	
LINK ACT	If the **LINK ACT** LED is lit, it indicates a working Ethernet connection.
COL	If the **COL** LED is lit, it indicates a network collision.
100	If the **100** LED is lit, it indicates a working 100 MB Ethernet connection (100 MB network, only). If the LED is not lit, it indicates a 10 MB Ethernet connection.
Rx/Tx	Rx and Tx LEDs next to each port provides information about the network connection of the serial port. 
PWR (16-Port with external power supply)	When lit, the **PWR** LED on the DeviceMaster indicates the devices is fully powered and has completed the boot cycle. ***Note:*** *The* **PWR** *LED flashes for approximately 15 seconds while booting. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*

Note: *The port LED activity on the DeviceMaster 16/32-Port may be inconsistent until the port has been opened. After a port is opened the LED activity works as documented.*

DeviceMaster 2-Port with Serial Terminals

Use the following information to connect the DeviceMaster UP 2-port.

1. Connect your serial devices to the appropriate serial port on the DeviceMaster UP using the appropriate cable. You can build your own cables or loopbacks using the appropriate discussions:
   - Serial Terminal (4) Signals (1E) on Page 56
   - Serial Terminal (8) Signals (2E) on Page 57
   - DeviceMaster 1E (Serial Terminals) Cables and Loopbacks on Page 63
   - DeviceMaster 2E (Serial Terminals) Cables and Loopbacks on Page 65

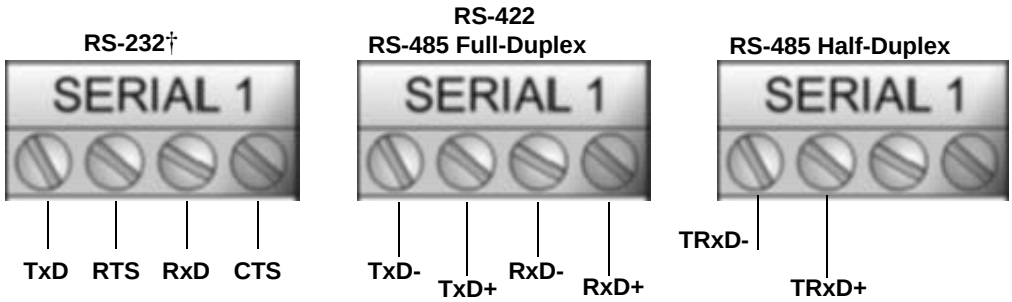
Note: *Refer to the hardware manufacturer's installation documentation if you need help with connector pinouts or cabling for the serial device.*

2. Verify that the devices are communicating properly. Use the appropriate table for information about the LEDs, which may provide information about the installation.

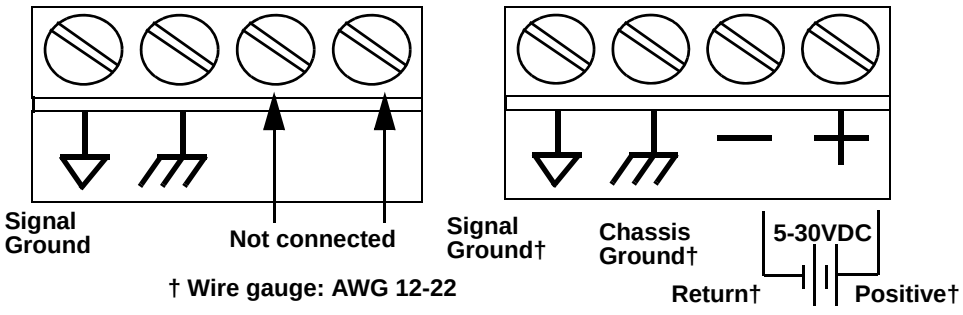
2-Port LED Descriptions	
STATUS	The **STATUS** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **STATUS** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
LINK	If the **LINK** (green) LED is lit, it indicates a working Ethernet connection.
ACT	If the **ACT** (yellow) LED flashes, it indicates network activity.
Note: *For additional LED information, go to the* **STATUS** *LED table on Page 97.*	

Serial Terminal (4) Signals (1E)

Use the following table or drawings for signal information. The signals for **SERIAL2** are the same as **SERIAL1**.



† *† RS-232 ground must be connected to the appropriate signal ground terminal.*

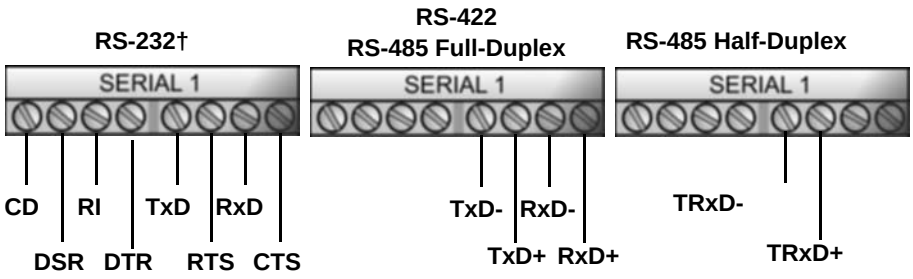


RS-232†	TxD	RTS	RxD	CTS
RS-422/RS-485 Full-Duplex	TxD-	TxD+	RxD-	RxD+
RS-485 Half-Duplex	TRxD-	TRxD+		

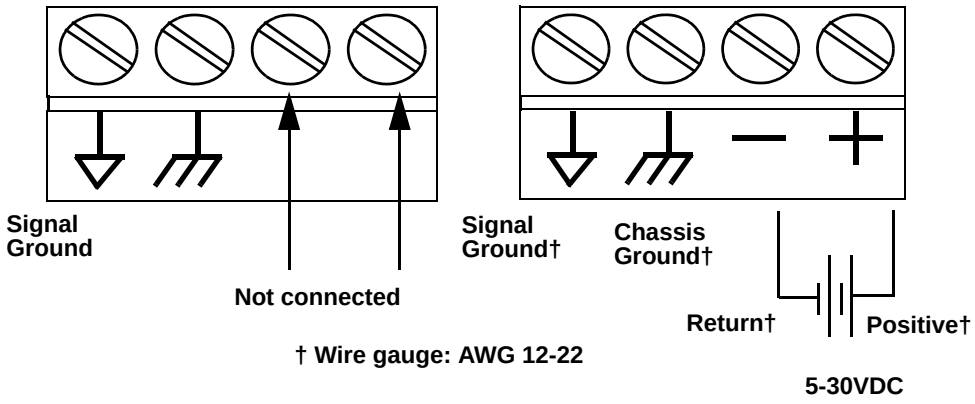
† RS-232 ground must be connected to the appropriate signal ground terminal.

Serial Terminal (8) Signals (2E)

Use the following drawings or table for signal information. The signals for **SERIAL2** are the same as **SERIAL1**.



† RS-232 ground must be connected to the appropriate signal ground terminal.



RS-232	CD	DSR	RI	DTR	TxD	RTS	RxD	CTS
RS-422/RS-485 Full-Duplex	N/A	N/A	N/A	N/A	TxD-	TxD+	RxD-	RxD+
RS-485 Half-Duplex	N/A	N/A	N/A	N/A	TRxD-	TRxD+	N/A	N/A

† RS-232 ground must be connected to the appropriate signal ground terminal.

DeviceMaster 2-Port (1E/2E) DB9 Connectors

Use the following information to connect the DeviceMaster UP 2-port.

1. Connect your serial devices to the appropriate serial port on the DeviceMaster UP using the appropriate cable.

   Use the following table and the appropiate discussion to build cables or loopback plugs.

   - DB9 Loopback Plugs on Page 59
   - DB9 Null-Modem Cables (RS-232) on Page 60
   - DB9 Null-Modem Cables (RS-422) on Page 60 (also supports RS-485 full-duplex)
   - DB9 Straight-Through Cables (RS-232/485) on Page 60

DB9 Connector Pinouts			
Pin	**RS-232**	**RS-422 RS-485 Full-Duplex (Master/Slave)**	**RS-485 Half-Duplex**
1	DCD	Not used	Not used
2	RxD	RxD-	Not used
3	TxD	TxD-	TRxD-
4	DTR	Not used	Not used
5	GND	Not used†	Not used†
6	DSR	Not used	Not used
7	RTS	TxD+	TRxD+
8	CTS	RxD+	Not used
9	RI	Not used	Not Used
† Pin 5 is tied to ground on the board, but is not used in the cable.			

Note: *Refer to the hardware manufacturer's installation documentation if you need help with connector pinouts or cabling for the serial device.*

2. Verify that the devices are communicating properly. Use the appropriate table for information about the LEDs, which may provide information about the installation.

2-Port LED Descriptions	
STATUS	The **STATUS** LED on the device is lit, indicating you have power and it has completed the boot cycle. ***Note:*** *The* **STATUS** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the cycle. When the Bootloader completes the cycle, the LED has a solid, steady light that blinks approximately every 10 seconds.*
LINK	If the **LINK** (green) LED is lit, it indicates a working Ethernet connection.
ACT	If the **ACT** (yellow) LED flashes, it indicates network activity.
Note: *For additional LED information, go to the* **STATUS** *LED table on Page 97.*	

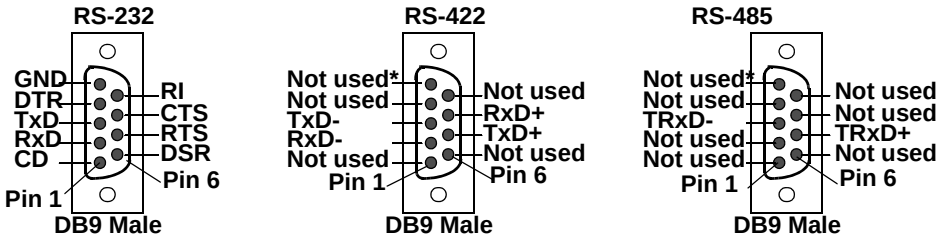
DB9 Serial Cables and Loopback Plugs

You can build your own null-modem or straight-through DB9 serial cables for 1-port and 4/8-port models using the following subsections.

Note: *See DeviceMaster 2-Port with Serial Terminals on Page 56 for 2-port models with DB9 connectors..*

DB9 Connector Pinouts			
Pin	**RS-232††**	**RS-422**	**RS-485**
1	DCD	Not used	Not used
2	RxD	RxD-	Not used
3	TxD	TxD-	TRxD-
4	DTR	Not used	Not used
5	GND	Not used†	Not used†
6	DSR	Not used	Not used
7	RTS	TxD+	TRxD+
8	CTS	RxD+	Not used
9	RI	Not used	Not Used
†	*Pin 5 is tied to ground on the board, but is not used in the cable.*		
††	*The DeviceMaster Serial Hub only supports RS-232.*		

This illustrates the DB9 connector signals.



*** Pin 5 is tied to ground on the board, but is not used in the cable.**

Note: *If you are using a DB9 to RJ45 adapter, see RJ45 Serial Cables and Loopback Plugs on Page 61.*

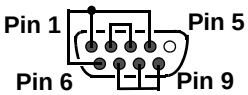
DB9 Loopback Plugs

Loopback connectors are DB9 female serial port plugs, with pins wired together as shown, that are used in conjunction with application software (Test Terminal or minicom) to test serial ports. The DeviceMaster is shipped with a a single loopback plug (RS-232/422).

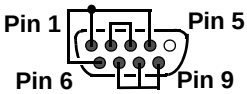
Note: *You can use Test Terminal (Windows) or minicom (Linux) to test the serial ports. You can use the Support page on the CD shipped with the DeviceMaster or see Locating Software and Documentation on Page 10) to locate the NS-Link User Guide for Windows or the Linux readme file.*

Wire the following pins together to build additional plugs or replace a missing RS-232 loopback plug:

- Pins 1 to 4 to 6
- Pins 2 to 3
- Pins 7 to 8 to 9



RS-232 Only (Back View)

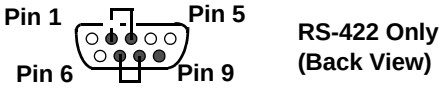


RS-232 Only (Back View)

The RS-232 loopback plug also works for RS-422.

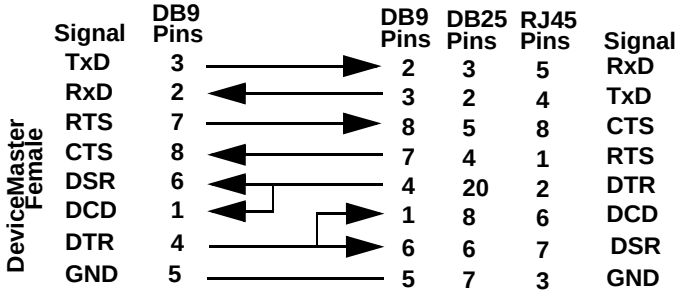
Wire the following pins together for an RS-422 loopback plug:

- Pins 2 to 3
- Pins 7 to 8



DB9 Null-Modem Cables (RS-232)

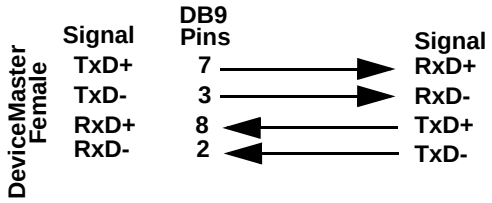
Use the following figure if you need to build an RS-232 null-modem cable. A null-modem cable is required for connecting DTE devices.



Note: *You may want to purchase or build a straight-through cable and purchase a null-modem adapter. For example, a null-modem cable can be used to connect COM2 of one PC to COM2 of another PC.*

DB9 Null-Modem Cables (RS-422)

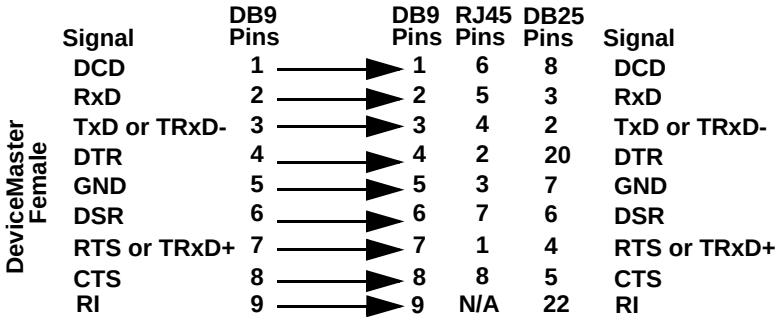
Use the following figure if you need to build an RS-422 null-modem cable.



Note: *RS-422 pinouts are not standardized. Each peripheral manufacturer uses different pinouts. Please refer to the documentation for the peripheral to determine the pinouts for the signals above.*

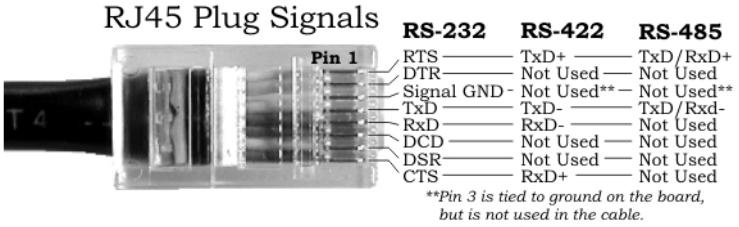
DB9 Straight-Through Cables (RS-232/485)

Use the following figure if you need to build an RS-232 or RS-485 straight-through cable. Straight-through cables are used to connect modems and other DCE devices. For example, a straight-through cable can be used to connect COM2 to a modem.



RJ45 Serial Cables and Loopback Plugs

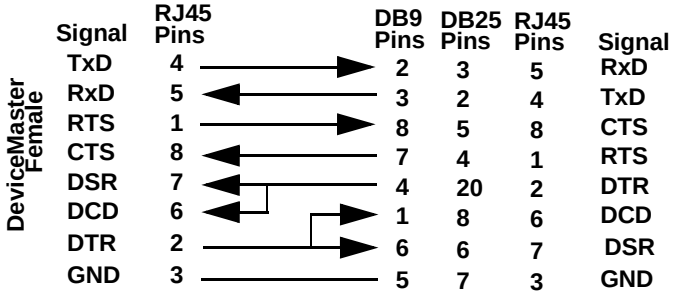
You can build your own null-modem or straight-through RJ45 serial cables using the following subsections.


RJ45 Plug Signals
Pin 1
RS-232
RS-422
RS-485
RTS — TxD+ — TxD/RxD+
DTR — Not Used — Not Used
Signal GND - Not Used** — Not Used**
TxD — TxD- — TxD/Rxd-
RxD — RxD- — Not Used
DCD — Not Used — Not Used
DSR — Not Used — Not Used
CTS — RxD+ — Not Used
**Pin 3 is tied to ground on the board, but is not used in the cable.

Pin	RS-232	RS-422	RS-485
1	RTS	TxD+	TRxD+
2	DTR	Not used	Not used
3	Signal GND	Not used†	Not used†
4	TxD	TxD-	TRxD-
5	RxD	RxD-	Not used
6	DCD	Not used	Not used
7	DSR	Not used	Not used
8	CTS	RxD+	Not used
† *Pin 3 is tied to ground on the board, but is not used in the cable.*			

RJ45 Null-Modem Cables (RS-232)

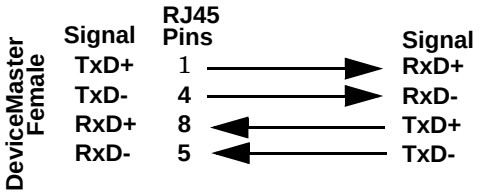
Use the following figure if you need to build an RS-232 null-modem cable. A null-modem cable is required for connecting DTE devices.


DeviceMaster Female
Signal
RJ45 Pins
DB9 Pins
DB25 Pins
RJ45 Pins
Signal
TxD 4 2 3 5 RxD
RxD 5 3 2 4 TxD
RTS 1 8 5 8 CTS
CTS 8 7 4 1 RTS
DSR 7 4 20 2 DTR
DCD 6 1 8 6 DCD
DTR 2 6 6 7 DSR
GND 3 5 7 3 GND

Note: *You may want to purchase or build a straight-through cable and purchase a null-modem adapter. For example, a null-modem cable can be used to connect COM2 of one PC to COM2 of another PC.*

RJ45 Null-Modem Cables (RS-422)

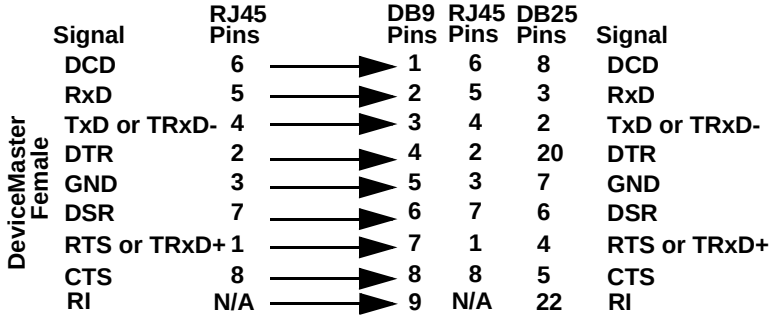
Use the following figure if you need to build an RS-422 null-modem RJ45 cable. A null-modem cable is required for connecting DTE devices.



Note: *RS-422 pinouts are not standardized. Each peripheral manufacturer uses different pinouts. Please refer to the documentation for the peripheral to determine the pinouts for the signals above.*

Straight-Through Cables (RS-232/485)

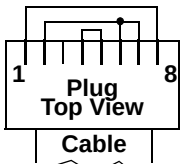
Use the following figure if you need to build an RS-232 or RS-485 straight-through cable. Straight-through cables are used to connect modems and other DCE devices. For example, a straight-through cable can be used to connect COM2 of one PC to COM2 to a modem.


DeviceMaster Female
Signal
RJ45 Pins
DB9 Pins
RJ45 Pins
DB25 Pins
Signal
DCD 6 1 6 8 DCD
RxD 5 2 5 3 RxD
TxD or TRxD- 4 3 4 2 TxD or TRxD-
DTR 2 4 2 20 DTR
GND 3 5 3 7 GND
DSR 7 6 7 6 DSR
RTS or TRxD+ 1 7 1 4 RTS or TRxD+
CTS 8 8 8 5 CTS
RI N/A 9 N/A 22 RI

RJ45 Loopback Plugs

Loopback connectors are RJ45 serial port plugs, with pins wired together as shown, that are used in conjunction with application software (Test Terminal or Minicom) to test serial ports. The DeviceMaster is shipped with a a single loopback plug (RS-232/422).

- Pins 4 to 5
- Pins 1 to 8
- Pins 2 to 6 to 7

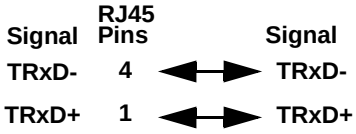


The RS-232 loopback plug also works for RS-422.

Note: *You can use Test Terminal (Windows) or minicom (Linux) to test the serial ports. You can use the Support page on the CD shipped with the DeviceMaster or see Locating Software and Documentation on Page 10) to locate the NS-Link User Guide for Windows or the Linux readme file.*

RS-485 Test Cable

You can use a straight-through cable as illustrated previously, or build your own cable.



Note: *RS-422 pinouts are not standardized. Each peripheral manufacturer uses different pinouts. Please refer to the documentation for the peripheral to determine the pinouts for the signals above.*

DeviceMaster 1E (Serial Terminals) Cables and Loopbacks

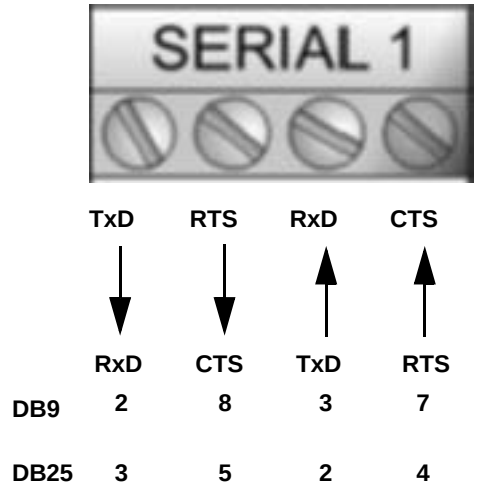
Use the appropriate discussion to build the following cables:

- Serial Terminal (4) Null-Modem Cables (RS-232) on Page 63
- Serial Terminal (4) Null-Modem Cables (RS-422) on Page 63
- Serial Terminal (4) Straight-Through Cables (RS-232/485) on Page 64
- 1E Loopback Signals on Page 64

Serial Terminal (4) Null-Modem Cables (RS-232)

An RS-232 null-modem cable is required for connecting DTE devices.

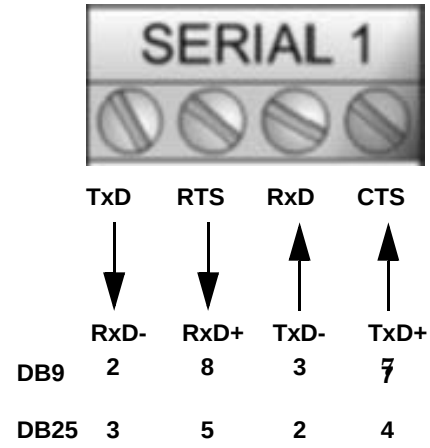
RS-232 Null-Modem Cable



Serial Terminal (4) Null-Modem Cables (RS-422)

An RS-422 null-modem cable is required for connecting DTE devices.

RS-422 Null-Modem Cable

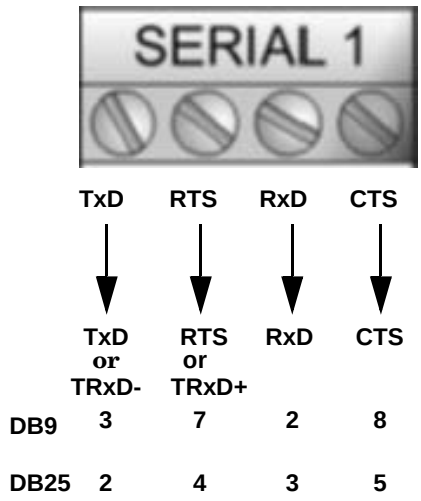


Note: *RS-422 pinouts are not standardized. Each peripheral manufacturer uses different pinouts. Please refer to the documentation for the peripheral to determine the pinouts for the signals above.*

Serial Terminal (4) Straight-Through Cables (RS-232/485)

RS-232 or RS-485 straight-through cables are used to connect modems and other DCE devices.

RS-232/422 Straight-Through Cable



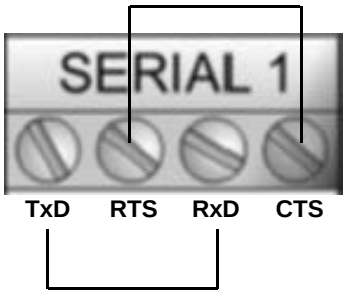
1E Loopback Signals

Use this drawing to wire a loopback, which is used in conjunction with application software (Test Terminal or minicom) to test serial ports.

See the NS-Link User Guide for Windows about using Test Terminal or Using minicom to Test Comtrol Ports to test the serial ports. Optionally, this information is on the *Software and Documentation* CD shipped with the product.

Wire the terminals together to create a loopback.

- TxD to RxD
- RTS to CTS



DeviceMaster 2E (Serial Terminals) Cables and Loopbacks

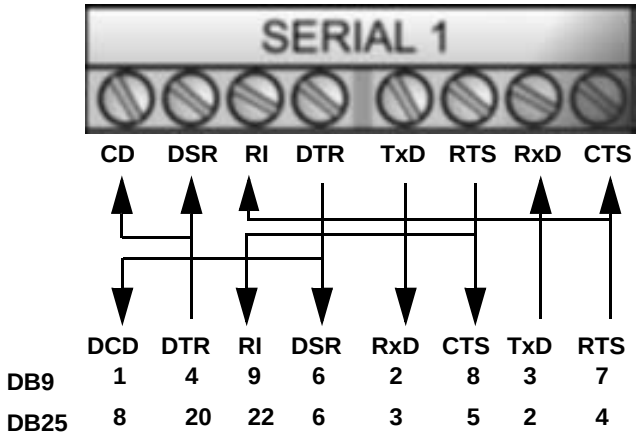
Use the appropriate discussion to build the following cables:

- Serial Terminal (8) Null-Modem Cables (RS-232) on Page 65
- Serial Terminal (8) Null-Modem Cables (RS-422) on Page 65
- Serial Terminal (8) Straight-Through Cables (RS-232/485) on Page 66
- 2E Loopback Signals on Page 66

Serial Terminal (8) Null-Modem Cables (RS-232)

An RS-232 null-modem cable is required for connecting DTE devices.

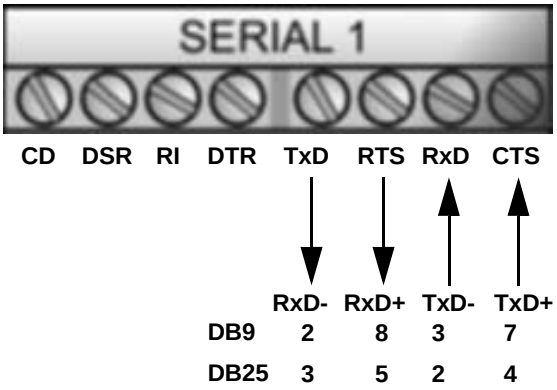
RS-232 Null-Modem Cable



Serial Terminal (8) Null-Modem Cables (RS-422)

An RS-422 null-modem cable is required for connecting DTE devices.

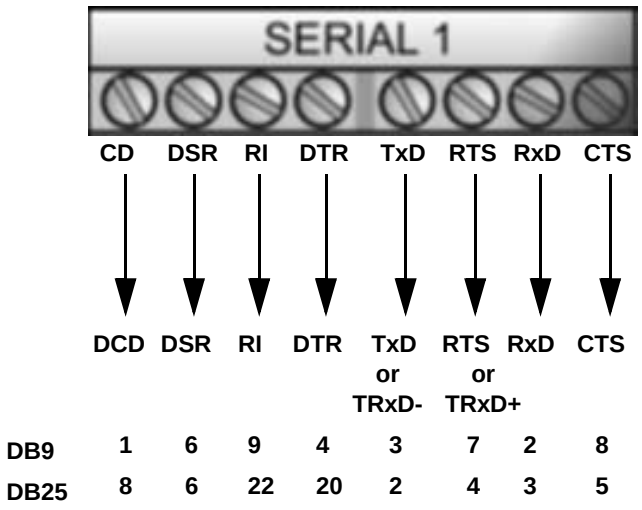
RS-422 Null-Modem Cable



Serial Terminal (8) Straight-Through Cables (RS-232/485)

RS-232 or RS-485 straight-through cables are used to connect modems and other DCE devices.

RS-232/485 Straight-Through Cable



DB9	1	6	9	4	3	7	2	8
DB25	8	6	22	20	2	4	3	5

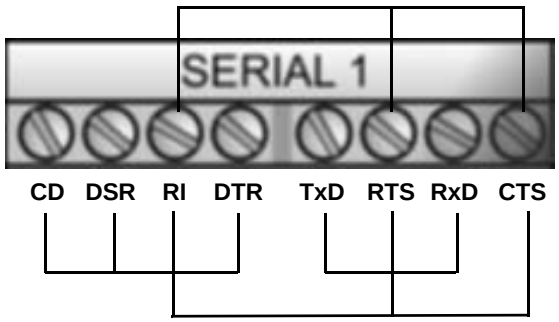
2E Loopback Signals

Use the drawing below to wire a loopback, which is used in conjunction with application software (Test Terminal or minicom) to test serial ports.

See the NS-Link User Guide for Windows about using Test Terminal or Using minicom to Test Comtrol Ports to test the serial ports. Optionally, this information is on the *Software and Documentation* CD shipped with the product.

Wire the terminals together to create a loopback.

- TxD to RxD
- RTS to CTS to RI
- DTR to CD to DSR



Managing the DeviceMaster

This section discusses the following DeviceMaster maintenance procedures:

- *Rebooting the DeviceMaster*
- Uploading SocketServer to Multiple DeviceMasters on Page 68
- Configuring Multiple DeviceMasters Network Addresses on Page 68
- Using Configuration Files on Page 69
- Managing Bootloader on Page 70, which also discusses checking the Bootloader version and downloading the latest Bootloader
- Adding a DeviceMaster to an Existing Installation on Page 72
- Replacing a DeviceMaster on Page 72
- Restoring Factory Defaults (2-Port, Only) on Page 73

Note: *You can optionally refer to RedBoot Procedures on Page 75 if you want to perform procedures at the RedBoot level.*

Rebooting the DeviceMaster

There are many ways to reboot the DeviceMaster. Use the method that most fits your situation.

Method	Procedure
PortVision Plus	*Main screen*: Right-click the DeviceMaster or DeviceMasters, click **Reboot Device** and then **Yes**. *Configure Device* screen: Click **Reboot Device** and then **Yes**.
Web page	*Main page*: Scroll to the bottom of the screen, click **Reboot** and then **Yes: Reboot**.
Telnet	Type **reset**.
DeviceMaster 2-Port Models	DeviceMaster 2-port models have a reset/restore switch. • If the reset/restore switch is depressed for less than 2 seconds, DeviceMaster RTS 2-port models reboot. • If the reset/restore switch is depressed for greater than approximately 5 seconds it restores the default password and network setting values.

Optionally, you can power cycle the DeviceMaster.

Uploading SocketServer to Multiple DeviceMasters

If the Windows NS-Link driver has been installed, make sure that the driver is disabled through the *Device Manager* before uploading SocketServer.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33) and **Scan** the network.
2. Shift-click the multiple DeviceMasters on the **Main** screen that you want to update and use one of the following methods:
   - Click the **Upload** button
   - Right-click and then click **Upload Firmware**
   - Click **Upload Firmware** on the **Device** menu
3. Browse, click the firmware (**.bin**) file, **Open** (*Please locate the new firmware*), and then click **Yes** (*Upload Firmware*).

   It may take a few moments for the firmware to upload onto the device. The device will reboot itself during the upload process.
4. Click **Ok** to the advisory message about waiting to use the device until the status reads **ON-LINE**.

In the next polling cycle, PortVision Plus will update the *List View* pane and display the new firmware version.

Configuring Multiple DeviceMasters Network Addresses

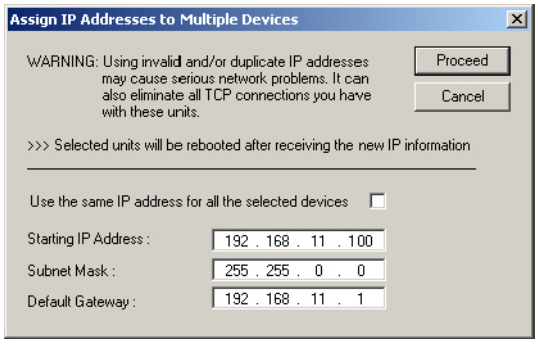
The DeviceMasters must be on the same network segment for the following procedure to work.

Optionally, you may want to create a configuration file and also configure the Email, RFC1006, and Port Settings. See Using Configuration Files on Page 69 for more information.

Use the following steps to configure multiple DeviceMasters.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33) and **Scan** the network.
2. Shift-click the DeviceMasters for which you want to program network information, right-click, and click **Assign IP to Multiple Devices**.
3. Enter the starting IP address, subnet mask, IP Gateway and click **Proceed**.

   PortVision Plus displays the programmed IP addresses in the *List View* pane after the next refresh cycle.


Assign IP Addresses to Multiple Devices
WARNING: Using invalid and/or duplicate IP addresses may cause serious network problems. It can also eliminate all TCP connections you have with these units.
Proceed
Cancel
>>> Selected units will be rebooted after receiving the new IP information
Use the same IP address for all the selected devices
Starting IP Address :
192 . 168 . 11 . 100
Subnet Mask :
255 . 255 . 0 . 0
Default Gateway :
192 . 168 . 11 . 1

Using Configuration Files

If you are deploying multiple DeviceMaster units that share common values, you can save the configuration file (.**dmc**) from the *Main* or *Configure Device* screens in PortVision Plus and load that configuration onto other DeviceMaster units.

If you save a configuration file from the *Main* or *Configure Device* screen, you can choose what properties you want saved.

Use this procedure to save a configuration file using the *Main* screen.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33) and **Scan** the network.
2. Highlight the device on the *Main* screen that you want to save its configuration and use one of the following methods:
   - Click the **Save** button
   - Right-click and then click **Save Configuration to File**
3. Browse to the location you want to save the file, enter a file name and click **Save**.
4. Click the **All** checkbox or click only the properties that you want saved for each property page in the configuration file and click **Done**.

   Note: *Selecting the* **All** *option with multiple DeviceMasters highlighted will apply the same IP address to all of the selected DeviceMasters.*
5. Click **Ok** to close the *Save Configuration Completed* message.

Use the following procedure to load a previously saved a DeviceMaster configuration file. Load a configuration file and apply it to a selected DeviceMaster or DeviceMasters from the *Main* or *Configure Device* screen.

Use this procedure to load a configuration file using the *Main* screen to one or more DeviceMaster units.

1. Highlight the device or devices on the *Main* screen that you want to load and use one of the following methods:
   - Click the **Load** button
   - Right-click and then click **Load Configuration to File**
   - Click **Load Configuration to File** on the *Device* menu
2. Click **Yes** to the warning that it will take 25 seconds per device and it may also reboot the devices.
3. Browse to the location of the configuration file, click the file name and then **Open**.
4. Click the **All** checkbox or click only the properties that you want to load for each property page in the configuration file and then click **Done**.
5. Close the *Load Configuration* popup message.

Managing Bootloader

Bootloader refers to the operating system that runs on the DeviceMaster hardware during the power on phase, which then loads SocketServer.

Note: *Typically, you should not update the Bootloader unless advised to do so by Comtrol Technical Support.*

There are several methods and tools that you can use to check the Bootloader version or update the Bootloader.

- **PortVision Plus** is the easiest way to check the Bootloader version and uploads the latest version.
- Redboot can be used to check the Bootloader version and update the Bootloader, if necessary. See RedBoot Procedures on Page 75 for procedures.

Checking the Bootloader Version

The following procedure uses PortVision Plus to check the Bootloader version. Optionally, you can use Redboot, see Determining the Bootloader Version on Page 78.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33) and **Scan** the network.
2. Right-click the DeviceMaster and click **Reboot Device**.
3. Click **Yes** to the *Confirm Reboot* query.
4. Right-click the DeviceMaster, click **Refresh Device** as many times as necessary to catch the reboot cycle in the *List View* pane. The Bootloader version is briefly displayed during the reboot cycle before SocketServer loads.
5. Check the Comtrol web site to see if a later version is available.
6. Go to the next subsection to upload a new version of Bootloader.

Uploading Bootloader

Use the following procedure to upload Bootloader to the DeviceMaster. Typically, you should not update the Bootloader unless advised to do so by Comtrol Technical Support.

Note: *Technical Support does not recommend updating Bootloader across a WAN. For best results, connect the DeviceMaster directly to a PC or laptop to upload Bootloader.*

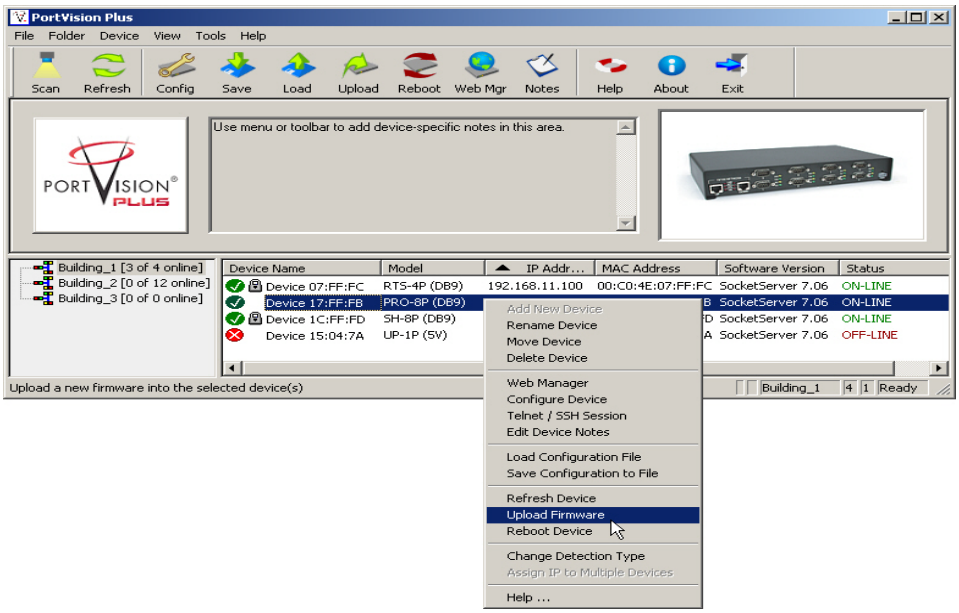
Make sure that power is not interrupted while uploading Bootloader. Power interruption while uploading Bootloader will require that the DeviceMaster must be sent into Comtrol so that it can be reflashed.

If you are not successful uploading SocketServer into the DeviceMaster, do not upload Bootloader.

If the NS-Link driver for Windows has been installed, make sure that the driver is disabled through the *Device Manager* before uploading Bootloader.

1. If you have not done so, install PortVision Plus (Installing PortVision Plus on Page 33) and **Scan** the network.
2. If necessary, check the Bootloader version and download the latest version.

3. Right-click the DeviceMaster for which you want to update, click **Upload Firmware**, browse to the Bootloader **.bin** file, and then click **Open**.


PortVision Plus
File Folder Device View Tools Help
Scan Refresh Config Save Load Upload Reboot Web Mgr Notes Help About Exit
Use menu or toolbar to add device-specific notes in this area.
Building_1 [3 of 4 online]
Building_2 [0 of 12 online]
Building_3 [0 of 0 online]
Device Name Model IP Addr... MAC Address Software Version Status
Device 07:FF:FC RTS-4P (DB9) 192.168.11.100 00:C0:4E:07:FF:FC SocketServer 7.06 ON-LINE
Device 17:FF:FB PRO-8P (DB9) SocketServer 7.06 ON-LINE
Device 1C:FF:FD SH-8P (DB9) SocketServer 7.06 ON-LINE
Device 15:04:7A UP-1P (5V) SocketServer 7.06 OFF-LINE
Add New Device
Rename Device
Move Device
Delete Device
Web Manager
Configure Device
Telnet / SSH Session
Edit Device Notes
Load Configuration File
Save Configuration to File
Refresh Device
Upload Firmware
Reboot Device
Change Detection Type
Assign IP to Multiple Devices
Help ...
Upload a new firmware into the selected device(s)
Building_1 4 1 Ready

4. Click **Yes** to the *Upload Firmware* message that warns you that this is a sensitive process.
5. Click **Ok** to the second *Upload Firmware* message and then click **Refresh** until the Bootloader version displays in the *List View* pane, which should show the new version.

Adding a DeviceMaster to an Existing Installation

Use this procedure to add another DeviceMaster to an existing configuration.

1. Install the DeviceMaster to an Ethernet hub or server NIC. If necessary, see Hardware Installation on Page 13.

   Note: *Technical support recommends installing and testing one DeviceMaster at a time when installing multiple DeviceMasters. In the event troubleshooting must be done, a single DeviceMaster is easier to resolve than several at once.*

2. Power-up the new DeviceMaster and verify that boot cycle completes.

   Note: *The* **PWR** *or* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the boot cycle.*

3. If required, program an IP address into the new DeviceMaster.
4. Configure serial ports to support the serial devices.

Replacing a DeviceMaster

Follow the appropriate procedure to replace DeviceMaster with another DeviceMaster in an existing configuration.

Device Programmed with IP Address

Use this procedure to replace hardware if the existing device is programmed for use with an IP address.

1. Configure the IP address in the new DeviceMaster.
2. Remove the old DeviceMaster and attach a new or spare DeviceMaster.
3. Connect the new DeviceMaster to the network hub or server NIC.
4. Power-up the new DeviceMaster and verify that boot cycle completes.

   Note: *The* **PWR** *or* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the boot cycle.*

5. If using socket mode, configure any ports as necessary to match the previous DeviceMaster.
6. Transfer *all* cabling from the old DeviceMaster to the new DeviceMaster.
7. *It is not necessary* to shut down and restart the host PC.

Device Programmed with MAC Address

Use this procedure to replace hardware if the existing device is using a MAC address for communications.

1. Remove the old DeviceMaster and attach a new or spare DeviceMaster.
2. Connect the new DeviceMaster to the network hub or server NIC.
3. Power-up the new DeviceMaster and verify that boot cycle completes.

   Note: *The* **PWR** *or* **Status** *LED flashes while booting and it takes approximately 15 seconds for the Bootloader to complete the boot cycle.*

4. If you are using NS-Link, change the MAC address of the new DeviceMaster in the NS-Link driver to reflect the new DeviceMaster.
5. If using socket mode, configure any ports as necessary to match the previous DeviceMaster.
6. Transfer *all* cabling from the old DeviceMaster to the new DeviceMaster.
7. Restart the host PC.

Restoring Factory Defaults (2-Port, Only)

Use the following procedures to restore the DeviceMaster to the factory defaults.

If Technical Support advises you to restore the DeviceMaster factory defaults, depress the **Reset/Restore** switch for greater than 5 seconds.

Restoring the DeviceMaster resets the following to their factory defaults:

- Network settings
- Password
- Telnet enable
- Start up time-out
- SSL enable
- Telnet time-out

Restoring Serial Port Settings

Use the web page and/or the NS-Link device driver for Windows to restore the serial port settings to their default values.

The NS-Link serial port settings are independent of the socket serial port settings on the web page. If you are using COM ports and also have configured the port for socket services, you must restore the default port settings in the driver and web page.

NS-Link COM Port

Click **Defaults** (and if appropriate, **Clone**) and **Ok** in the NS-Link *COM Properties* screen to reset the serial port settings.

If necessary, refer to the NS-Link User Guide for Windows (also available on the CD) for additional information about NS-Link.

Socket Port

Use the following procedure to reset the socket port serial settings.

1. Open the DeviceMaster web page (Accessing Socket Configuration on Page 51).
2. Scroll to the bottom of the *Server Configuration* page and click **Reboot**.
3. Click **Set configuration for all ports to factory default settings** and the click **Yes, Reboot**.

RedBoot Procedures

Use this section as a reference if you want to perform tasks in Redboot. Typically, most of these procedures can be performed using PortVision Plus.

Overview

You can use a *serial* connection between Port 1 on the DeviceMaster and a COM port on a PC. If you plan on using the serial method, you will need a null modem cable and a terminal program installed and configured on the PC.

Note: *Use the serial connection method, if the DeviceMaster is not on the same Ethernet network segment as the PC.*

You can use a *telnet* connection, if the DeviceMaster is locally accessible by Ethernet.

If necessary, see Establishing a Serial Connection on Page 75 or Establishing a Telnet Connection on Page 76 to disable the Bootloader before performing any of these procedures.

Establishing a Serial Connection

Use the following procedure to set up serial connection with a terminal server program (for example, Test Terminal (WCom2), HyperTerminal or Minicom) and the DeviceMaster. Test Terminal (WCom2) is available in PortVision Plus or you can also install the Comtrol Utility package.

1. Connect a null-modem cable from an available COM port on your PC to **Port 1** on the DeviceMaster.

   Note: *See DB9 Serial Cables and Loopback Plugs on Page 59 or RJ45 Serial Cables and Loopback Plugs on Page 61 to build a null-modem cable.*

2. Configure a terminal server program (such as, HyperTerminal or Minicom) to the following values:
   - Bits per second = 57600
   - Data bits = 8
   - Parity = None
   - Stop bits = 1
   - Flow control = None
3. Reset the DeviceMaster.

   Note: *Depending on the model, disconnect and reconnect the power cable (external power supply and no power switch) or turn the power switch on and then off (internal power supply).*

4. Immediately type **#!DM** and press **Enter** in the terminal program.
5. At the **RedBoot>** prompt, type **dis**, and press **Enter**.

   Note: *If you do not disable the loading feature of the Bootloader within the time-out period (default is fifteen seconds), an application will be loaded from flash and started. If this happens, repeat Steps 3 through 5. The **#!DM** command is the only case-sensitive command and must be in uppercase.*

6. Verify that the system responds with a **Loading disabled** message.

```
#!DM
RedBoot>dis
Loading disabled
```

7. Go to the appropriate task:
   - Determining the Network Settings on Page 77
   - Configuring the Network Settings on Page 77
   - Determining the Bootloader Version on Page 78
   - Resetting the DeviceMaster on Page 78
   - Uploading Firmware on Page 79
   - Configuring Passwords on Page 82
   - Redboot Command Overview on Page 83.

Establishing a Telnet Connection

Use the following procedure to telnet to the DeviceMaster.

1. Open a telnet session, enter the DeviceMaster IP address. If using Windows, open a **Command** window and type **telnet** [***ip_address***].

   Note: *Press the* **Enter** *key if you have not programmed a password or use the password previously configured. The DeviceMaster does not come pre-programmed with a password.*

2. Type **reset**, and close the session.
3. Open a new telnet session, enter the DeviceMaster IP address, and the password.
4. Type **dis** to disable the Bootloader.

```
******************************************
**
**  Comtrol DeviceMaster Bootloader Version 3.05
**  RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**  Platform: Comtrol DeviceMaster (ARM 7TDMI)
**  Portions Copyright (C) 2000. Red Hat, Inc.
**  Portions Copyright (C) 2001-2008 Comtrol Corp.
******************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot> dis
Loading disabled
RedBoot> _
```

5. Verify that the system responds with a **Loading disabled** message.
6. Go to the appropriate task:
   - Determining the Network Settings on Page 77
   - Configuring the Network Settings on Page 77
   - Determining the Bootloader Version on Page 78
   - Resetting the DeviceMaster on Page 78
   - Uploading Firmware on Page 79
   - Configuring Passwords on Page 82
   - Redboot Command Overview on Page 83.

Determining the Network Settings

If you are not sure what the network information is on a DeviceMaster, you can perform the following procedure.

1. Establish communications with the DeviceMaster using the serial (Page 75) method.
2. At the **RedBoot** prompt, type **ip**.

Default Network Settings

IP address:
192.168.250.250

Subnet mask:
255.255.0.0

Gateway address:
192.168.250.1

```
RedBoot>dis
Loading disabled
RedBoot> ip
IP Config: IpAddr 192.168.250.250 IpMask 255.255.0.0 IpGate 192.168.250.1
RedBoot>
```

The IP address, subnet mask, and IP gateway values will display.

Note: *Optionally, you can install PortVision Plus on a Windows system on the network and see the IP information in the List View pane.*

Configuring the Network Settings

The following subsections show you how to establish a communications link with Redboot on the DeviceMaster, by using one of these methods:

- *Serial connection* between Port 1 on the DeviceMaster and a COM port on a PC.

  If you do not know the IP address of the DeviceMaster you must use a serial connection to communicate with the DeviceMaster.

- *Telnet connection* requires that you know the IP address. In addition, the IP address must also be valid for the network to which it is attached. For example: The network segment must be 192.168.250.x to telnet to the DeviceMaster default IP.

Note: *Optionally, you can install PortVision Plus on a Windows system on the network and use the Configure Device window to configure network settings.*

Use the following procedure to program the IP address using Redboot.

1. Establish communications with the DeviceMaster using the serial (Page 75) or telnet (Page 76) method.
2. Enter **ip [*addr mask gateway*]** and press the **Enter** key to configure the IP address. *Where*:

   addr = IP address you want to use

   mask = matches you network subnet mask

   gateway = assigned by your network administrator

   Make sure that each value is separated by a space.

```
RedBoot>dis
Loading disabled
RedBoot> ip ###.###.###.### ###.###.###.### ###.###.###.###
RedBoot> ip
IP Config: IpAddr ###.###.###.### IpMask ###.###.###.### IpGate ###.###.###.###
RedBoot> reset
... Resetting
```

3. Verify that Redboot responds with your configured network information or reissue the command.
4. Type **reset** to reset the DeviceMaster, if you do not have any other related Redboot tasks.

Determining the Bootloader Version

Use the following procedure to determine what Bootloader version is loaded in the DeviceMaster.

1. Establish communications with the DeviceMaster using the serial (Page 75) or telnet (Page 76) method.
2. At the **RedBoot** prompt, type **version**.

```
RedBoot> version
******************************************
**
**  Comtrol DeviceMaster Bootloader Version 3.05
**  RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**  Platform: Comtrol DeviceMaster (ARM 7TDMI)
**  Portions Copyright (C) 2000. Red Hat, Inc.
**  Portions Copyright (C) 2001-2008 Comtrol Corp.
******************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot>
```

   The Bootloader information displays.
3. To update the Bootloader on the DeviceMaster, make sure that you download the latest version and see Managing Bootloader on Page 70.
4. Type **reset** to reset the DeviceMaster, if you do not have any other related Redboot tasks.

Note: *Optionally, you can install PortVision Plus on a Windows system on the network and see the Bootloader version in the List View pane. Reboot the DeviceMaster, right-click the DeviceMaster and click Refresh Device until the Bootloader version displays. The Bootloader version is only displayed for a few moments.*

Resetting the DeviceMaster

When you have completed your tasks in Redboot, you must enter a **reset** command at the **RedBoot>** prompt for the DeviceMaster to begin operation.

Note: *The LEDs on the DeviceMaster will go through the power up sequence. The DeviceMaster has completed its reset cycle when the* **PWR** *or* **Status** *LED is lit and it stops flashing.*

Uploading Firmware

Use the appropriate procedure for your environment:

- Serial Method on Page 79
- Telnet Method on Page 80

Note: *Optionally, you can install PortVision Plus on a Windows system on the network and upload firmware. PortVision Plus is the recommended method for uploading firmware.*

Serial Method

The procedure for updating the Bootloader and SocketServer are the same, but the **.bin** files are unique.

1. Verify that you have the **.bin** file (Locating Software and Documentation on Page 10) and cable Establishing a Serial Connection on Page 75).
2. Connect a null modem cable from an available COM port on your PC to **Port 1** on the DeviceMaster.
3. Start the terminal program and configure your terminal server program (for example, HyperTerminal or minicom) to the following values:
   - Bits per second = 57600
   - Data bits = 8
   - Parity = None
   - Stop bits = 1
   - Flow control = None
4. Reset the DeviceMaster (disconnect and reconnect the power cable).
5. Immediately type **#!DM** and press **Enter** in your terminal program.

```
#!DM
RedBoot>dis
Loading disabled
```

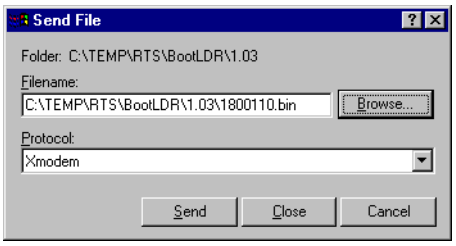
6. At the **RedBoot>** prompt, type **dis**, and press **Enter**.

   Note: *If you are unsuccessful in disabling the Bootloader within ten seconds, type* **reset**, **#!DM**, *and* **dis** *again. The* **#!DM** *command is the only case-sensitive command and must be in uppercase.*

7. Verify that the system responds with an **Loading disabled** message.
8. Type **load -r -b 0 -m x** at the **RedBoot>** prompt and press **Enter**.

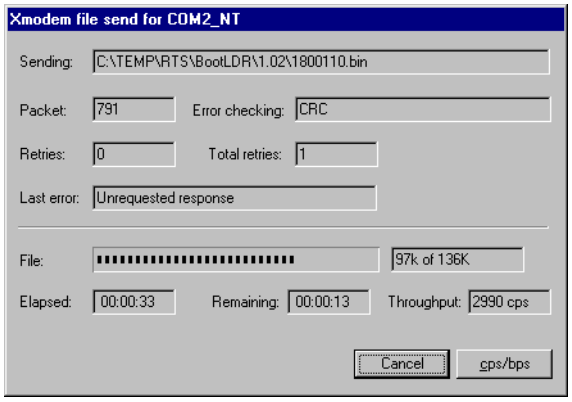
```
RedBoot> load -r -b 0 -m x
CC
```

9. Upload the file using Xmodem for the protocol. For example, if you are using HyperTerminal:
   a. Click **Transfer**.
   b. Click **Send File**.
   c. Browse to the location where you stored the file from Locating Software and Documentation on Page 10.
   d. Click **Xmodem** as the protocol.



The file name in this screen shows the Bootloader.

e. Click **Send**.



10. When the **RedBoot>** prompt appears (after approximately one minute for the Bootloader and approximately three minutes for SocketServer), type **go**.

```
CCCCCCRaw load done: 542721 bytes read
Address range:  00000000-00084800, Entry point:  00000000,
xyzModem - CRC mode, 4241(SOH)/0(STX)/0(CAN) packets, 8 tries
RedBoot> go
... Erase from 0x05030000-0x050c0000: .........
... Program from 0x00000000-0x00084801 at 0x05060000: ...
... Erase from 0x050f0000-0x05400000:  .
... Program from 0x007a0000-0x007b0000 at 0x053f0000: .
```

Note: *In a few seconds, the ethernet and PWR LEDs cycle through a light sequence once and then upgrade is complete.*

11. ***If you updated*** *SocketServer:* type, **fis list** and press **Enter** at the RedBoot> prompt.

```
RedBoot> fis list
Name              FLASH addr   Mem addr    Length      Entry point
FIS_directory   0x053F0000   0x053F0000  0x00010000  0x00000000
default           0x05030000   0x00000000  0x00090000  0x00000000
RedBoot>
```

Note: *You should see file information for a file called **default**. If you do not see this file, repeat the process starting with Step 6.*

12. Reset the DeviceMaster by typing **reset** at the RedBoot> prompt.

```
RedBoot> reset
. . .Resetting
```

Note: *In a few seconds the ethernet and PWR LEDs cycle through a light sequence once and the update is complete.*

13. Start your internet browser and enter the IP address of the DeviceMaster to verify that the new version of SocketServer loads.

Telnet Method

Use the following procedure to update the Bootloader or SocketServer with telnet to the DeviceMaster.

Note: *A TFTP server is required to perform firmware updates using Redboot.*

1. Verify that you have the **.bin** file (Locating Software and Documentation on Page 10).
2. Open a telnet session, type **reset**, and close the session.

3. Open a new telnet session and enter the DeviceMaster IP address.

```
$ telnet 192.168.250.250 ◄──── Default IP Address
Trying 192.168.250.250...
Connected to 192.168.250.250.
Escape character is '^]'.
```

4. Enter the webserver password.

   Note: *Press the* **Enter** *key if you have not programmed a password.*

```
Password:
****************************************
**
**  Comtrol DeviceMaster Bootloader Version 3.05
**  RedBoot(tm) environment - built 08:13:02, Apr   4 2008
**  Platform: Comtrol DeviceMaster (ARM 7TDMI)
**  Portions Copyright (C) 2000. Red Hat, Inc.
**  Portions Copyright (C) 2001-2008 Comtrol Corp.
****************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot>
```

5. At the Redboot prompt: type **dis** and press **Enter** to disable the Bootloader.

```
RedBoot>dis
Loading disabled
```

6. Verify that the system responds with an **Loading disabled** message.
7. Load the file from a TFTP server using the following command and press the **Enter** key:

   load -r -b 0 -h <TFTP-Server_IP_Addr> <Downloaded_File_Name>

   Note: *The default IP address is:* **192.168.250.250**.

```
RedBoot> load -r -b 0 -h 192.168.250.1 1800110.bin
CCCCRaw load done: 139521 bytes read
Address range: 00000000-00022100, Entry point: 00000000.
xyzModem - Cksum mode, 1091(SOH)/0(STX)/0(CAN) packets, 6 retries
RedBoot>
```

8. When the RedBoot> prompt appears (after approximately one minute if you are uploading the Bootloader and approximately three minutes if you ware uploading SocketServer), type **go**.

```
RedBoot>go
```

   If uploading Bootloader: In a few seconds the ethernet and PWR LEDs cycle through a light sequence once and the update is complete.

If uploading SocketServer:

a. At the RedBoot> prompt, type: **fis list** and press **Enter**.

```
RedBoot> fis list
Name              FLASH addr   Mem addr    Length      Entry point
FIS_directory   0x053F0000   0x053F0000  0x00010000  0x00000000
default           0x05030000   0x00000000  0x00090000  0x00000000
RedBoot>
```

Note: *You should see file information for a file called* ***default****. If you do not see this file, repeat the process starting with Step 7.*

b. Reset the DeviceMaster by typing **reset** at the RedBoot> prompt.

Note: *In a few seconds the ethernet and PWR LEDs cycle through a light sequence once.*

c. Start your internet browser and enter the IP address of the DeviceMaster to verify that the new version of SocketServer loads.

Configuring Passwords

This section discusses how to configure a password for the web and telnet server.

Note: *See the PortVision Plus or socket Help system for information about email notification.*

Use the following procedure to establish the DeviceMaster password for the Web and telnet server. Establishing a password prevents unauthorized changes to the DeviceMaster configuration.

1. Establish communications with the DeviceMaster using the serial (Page 79) or telnet method (Page 76).
2. Type **password** [***your_password***] and press **Enter**.

   Note: *If you forget your password, you can reprogram the password using the serial method which bypasses the password.*

```
Password:
*******************************************
**
** Comtrol DeviceMaster Bootloader Version 3.05
** RedBoot(tm) environment - built 08:13:02, Apr   4 2008
** Platform: Comtrol DeviceMaster (ARM 7TDMI)
** Portions Copyright (C) 2000. Red Hat, Inc.
** Portions Copyright (C) 2001-2008 Comtrol Corp.
*******************************************

FLASH:  64 blocks of 65536 bytes each
FLASH:  4194304 bytes (0x05000000 - 0x05400000)
RAM:    8126464 bytes (0x00000000 - 0x007c0000)
RedBoot> dis
Loading disabled
RedBoot> password dev1357
Password 'dev1357'
RedBoot>
```

   Note: *The Bootloader version on your DeviceMaster may be different than the version displayed in this graphic.*

See the **auth** command in the Redboot Command Overview on Page 83 if you want to set up Web browser authentication.

Redboot Command Overview

The following table is an overview of Redboot commands available. You can access the list of commands online by entering **help** and pressing the **Enter** key. For more detailed information, see the *eCos Reference Manual* that is located on the Comtrol product CD or download it from the web.

RedBoot Commands	
auth **{noaccess, none, basic, md5, invalid}**	Sets or displays web authentication. The default is set to **none**, which means that there is no authentication required to access the web server. To deny access to the web server, click **noaccess** or **invalid**. If access is attempted, a message appears to notify the user that access is denied. To configure the web server to request an un-encrypted password, click **basic**. To configure the web server to request an encrypted password, click **md5**. (Some browsers do not support the **md5** command.)
boardrev†	Displays board revision.
cache [ON | OFF]	Manages machine caches.
chassis	Displays chassis information.
disable	Disables automatic load of the default application.
dump -b <location> -l <length>	Displays (hex dump) of a range of memory.
fis {cmds}	Manages flash images. See Chapter 2 of the eCos Reference Manual for **{cmds}** information.
go [-w <timeout>] [entry]	Executes code at a location.
help <topic>	Displays available Redboot commands.
ip {addr mask gateway}	Displays or sets the IP address configuration.
load {-r} {-v} {-h <host>} {-m {TFTP | xyzmodem}} {-b <base_addr>} <file_name>	Loads a file from TFTP server or XModem.
loop 232|422|int port-number	Runs loopback test on port. The DeviceMaster Serial Hub does not support this command.
mac†	Displays ethernet MAC address.
model†	Shows model number.
password {password}	Sets the password.
reset	Resets the DeviceMaster.
telnet [disable | enable}	Sets or displays telnet server enable. Disables telnet.
teltimeout [seconds]	Shows or sets telnet time-out.
terse	Terse command response mode.
timeout {seconds}	Displays or sets Bootloader time-out value.
t485 port #1 port #2	Runs port-to-port RS-485 test.
version	Displays RedBoot version information.
† *†Do not use these commands to change the values. Doing so may cause the DeviceMaster to stop functioning.*	

Hardware Specifications

The following subsections contain specifications and safety notices for the DeviceMaster family.

RoHS compliant products conform to EU Directive 2002/95/EC. These products do not contain any restricted substances (lead, cadmium, hexavalent chromium, mercury, PBB, and PBDE) except as specifically provided in the Directive.

Locating DeviceMaster Specifications

Specifications can be found on the Comtrol web site at:

- DeviceMaster AIR: http://www.comtrol.com/products/family/dmair
- DeviceMaster PRO: http://www.comtrol.com/products/family/dmpro
- DeviceMaster RTS VDC (1-port with 5-30VDC): http://www.comtrol.com/products/family/dmrtsvdc
- DeviceMaster RTS (all other models): http://www.comtrol.com/products/family/dmrts
- DeviceMaster Serial Hub: http://www.comtrol.com/products/family/dmsh

Serial Communications

This table provides DeviceMaster serial communications specifications.

Serial Communications	
Interface standards (software selectable)	RS-232, RS-422, and RS-485
Serial connector types: **DeviceMaster PRO**: 8-Port 16-Port **DeviceMaster RTS** 1-Port 1-Port Embedded System 2-port 4/8-Port models 16/32-Port models **DeviceMaster Serial Hub**	 DB9 Male (includes DB9 to RJ45) RJ45 Female DB9 Male Header, IDC10 Screw Terminal or DB9 DB9 (and DB9 to RJ45 adapter) RJ45 Female DB9 Male
Baud rate/port Receive buffer Transmit buffer	300 to 230.4K bps 1024 bytes 256 bytes

Serial Communications	
NS-Link control: Data bits Parity Stop bits Flow control	 7 or 8 Odd, even, none 1 or 2 Hardware or software
Network default values: IP address Subnet mask Gateway	 192.168.250.250 255.255.0.0 192.168.250.1
Network protocols	TCP/IP and UDP Socket services, BOOTP, TFTP, ICMP, ARP, SNMP (MIB-II), Telnet, HTTP, DHCP/RARP/Ping, RFC 1006
Event notification	SocketServer
SNMP support	Monitoring only

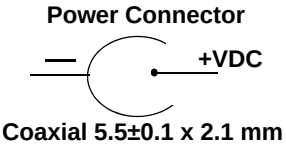
External Power Supply Specifications

This subsection discusses information that you may need if you wish to use your own external power supplies.

- 1-Port 5VDC Power Supply (below)
- 1-Port 5-30VDC Power Supply on Page 87
- 2-Port (Serial Terminals) Power Supply on Page 88
- 2-Port (DB9) Power Supply on Page 88
- 4-Port Power Supply on Page 88
- 8-Port Power Supply on Page 88
- 16-Port Power Supplies on Page 89

1-Port 5VDC Power Supply

This subsection only provides information for the DeviceMaster 1-port 5VDC model.



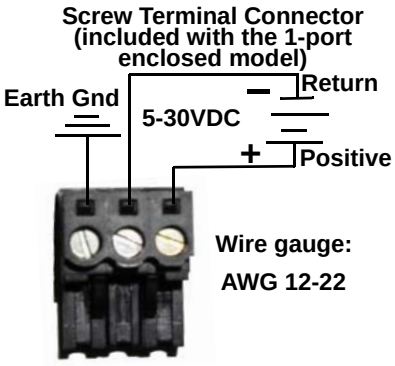
Comtrol Power Supply: 1-Port 5VDC	
Input line frequency	47 - 63 Hz
Input line voltage	90 - 132VAC (*standard* RTS) 90 - 260VAC (*IAD model*)
Output voltage	5VDC
Output current	2.4A @ 5VDC

The following table provides the specifications, if you intend on purchasing your own external power supply.

External Power Supply: 1-Port 5VDC	
Output voltage†	5VDC
Current†	420 mA (Min) @ 5VDC
Power	2.1 W
† *Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.*	

1-Port 5-30VDC Power Supply

This table provides specifications for the optional power supply from Comtrol.



Comtrol Power Supply: 1-Port 5-30VDC	
Input line frequency	43-63 Hz
Input line voltage	90-260 VAC
Output voltage	24VDC
Output current	500 mA @ 24VDC

This table provides the specifications, if you intend on using your own power supply.

External Power Supply: 1-Port 5-30VDC	
Output voltage†	5-30VDC
Current†	100 mA (Min) @ 24VDC
Power	2.5 W
† *Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.*	

2-Port (Serial Terminals) Power Supply

This table provides the specifications to purchase a power supply for a DeviceMaster 2-port 1E/2E model with serial terminal connectors..

External Power Supply: 2-Port (Serial Terminal Conectors) 5-30VDC	
Output voltage† Current† Power	5-30VDC 100 mA (Min) @ 24VDC 2.5 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

2-Port (DB9) Power Supply

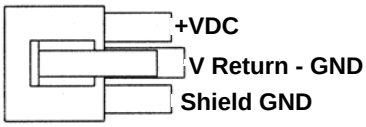
This table provides the specifications to purchase a power supply for a DeviceMaster 2-port 1E/2E model with serial terminal connectors..

External Power Supply: 2-Port (Serial Terminal Conectors) 6-30VDC	
Output voltage† Current† Power	6-30VDC 100 mA (Min) @ 24VDC 2.5 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

4-Port Power Supply

This table provides the specifications for the power supply shipped with the DeviceMaster 4-port.

Comtrol Power Supply: 4-Port	
Input line frequency Input line voltage Output voltage Output current	47 - 63 Hz 90 - 260 VAC 24VDC 500 mA @ 24VDC



Housing Molex P/N: 39-01-4030
Pins Molex P/N: 44485-1211

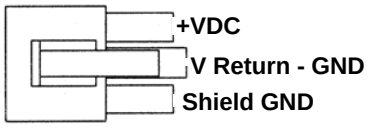
This table provides the specifications, if you intend on using your own power supply.

External Power Supply: 4-Port	
Output voltage† Current† Power	9-30VDC 200 mA (Min) @ 24VDC 4.8 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

8-Port Power Supply

The following table provides the specifications for the Comtrol-supplied power supply for the DeviceMaster 8-port.

Comtrol Power Supply: 8-Port	
Input line frequency Input line voltage Output voltage Output current	47 - 63 Hz 90 - 260 VAC 24VDC 500 mA @ 24VDC



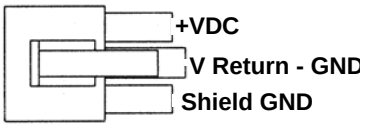
Housing Molex P/N: 39-01-4030
Pins Molex P/N: 44485-1211

The following table provides the specifications, if you intend on purchasing your own power supply.

External Power Supply: 8-Port	
Output voltage† Current† Power	9-30VDC 290 mA (Min) @ 24VDC 6.96 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

16-Port Power Supplies

The following table provides the specifications for the Comtrol-supplied power supply for the DeviceMaster 16-port models.



Housing Molex P/N: 39-01-4030
Pins Molex P/N: 44485-1211

Comtrol Power Supply: 16-Port Models	
Input line frequency Input line voltage Output voltage Output current	47 - 63 Hz 90 - 260 VAC 24VDC 500 mA @ 24VDC
Note: *The DeviceMaster RTS 16-port and 32-port models with a single Ethernet port have internal power supplies.*	

The following tables provide the specifications, if you intend on purchasing your own power supply for your DeviceMaster.

External Power Supply: 16-Port DeviceMaster PRO	
Input line frequency Input line voltage Output voltage† Output current†	47 - 63 Hz 90 - 260VAC 9-30VDC 290 mA (Min) @ 24VDC
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

External Power Supply: 16-Port DeviceMaster RTS	
Output voltage† Current† Power	9-30VDC 490 mA (Min) @ 24VDC 11.76 W
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

External Power Supply: 16-Port DeviceMaster Serial Hub	
Input line frequency Input line voltage Output voltage† Output current†	47 - 63 Hz 90 - 260VAC 9-30VDC 132 mA (Min) @ 24VDC
† Any power supply that meets current consumption, voltage, power, and connector pinouts requirements can be used.	

DeviceMaster Product Pictures

This subsections provides you with detailed pictures of the different DeviceMaster models:

- 1-Port (DB9) 5VDC on Page 90
- 1-Port (DB9) 5-30VDC on Page 91
- 1-Port Embedded on Page 92
- 2-Port (Serial Terminals) Power Supply on Page 88
- 4-Port (DB9) on Page 93
- 8-Port (DB9) on Page 93
- 16-Port (RJ45) External Power Supply on Page 94
- DeviceMaster Serial Hub 16-Port (DB9) on Page 94
- 16-Port (RJ45) Internal Power Supply on Page 94
- DeviceMaster PRO 16-Port (RJ45) on Page 94
- DeviceMaster RTS 32-Port (RJ45) on Page 94

See the appropriate discussion in the Hardware Installation section (Page 13) for information about the LEDs.

1-Port (DB9) 5VDC

This illustrates the DeviceMaster 1-Port 5VDC.

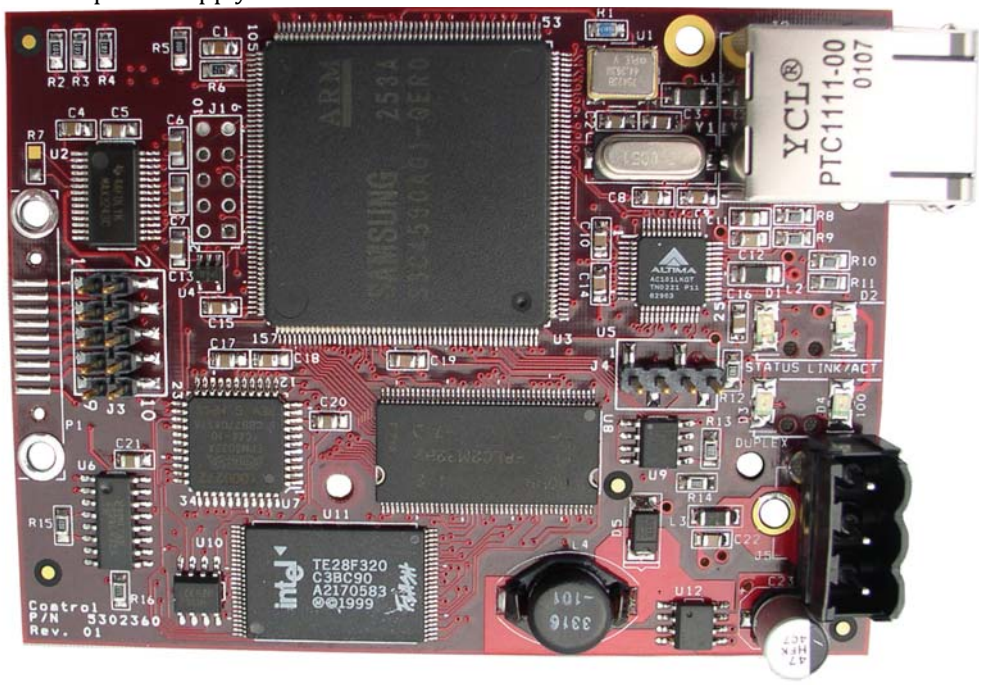
1-Port (DB9) 5-30VDC

This illustrates the DeviceMaster 1-Port 5-30VDC.

Note: *The supported input voltage (5VDC or 5-30VDC) is printed on the top and bottom of the DeviceMaster.*

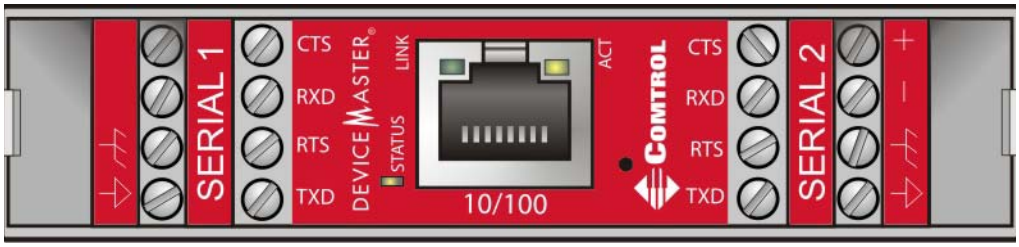
1-Port Embedded

This illustrates the DeviceMaster 1-port Embedded system that uses a 5-30VDC power supply. See 1-Port 5-30VDC Power Supply on Page 87 so that you can provide a power supply for the DeviceMaster.



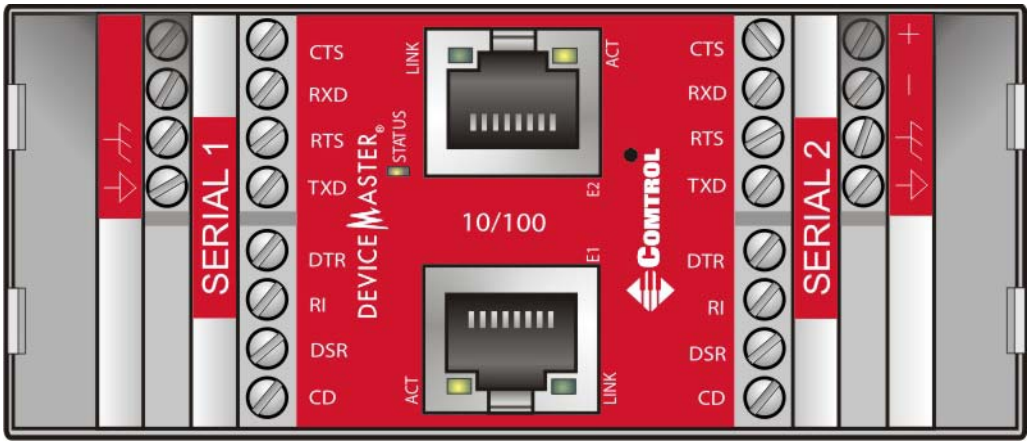
2-Port (Single Ethernet Port) with Serial Terminals

The DeviceMaster 2-port 1E with serial terminals uses a 5-30VDC power supply. See 2-Port (Serial Terminals) Power Supply on Page 88 for information about the power supply.



2-Port (Dual Ethernet Ports) with Serial Terminals

The DeviceMaster 2-port 2E with serial terminals uses a 5-30VDC power supply. See 2-Port (Serial Terminals) Power Supply on Page 88 for information about the power supply.



2-Port (Single Ethernet Port) DB9

The DeviceMaster 2-port 1E DB9 uses a 5-30VDC power supply. See 2-Port (Serial Terminals) Power Supply on Page 88 for information about the power supply.

2-Port (Dual Ethernet Ports) DB9

The DeviceMaster 2-port 2E DB9 uses a 5-30VDC power supply. See 2-Port (Serial Terminals) Power Supply on Page 88 for information about the power supply.

4-Port (DB9)

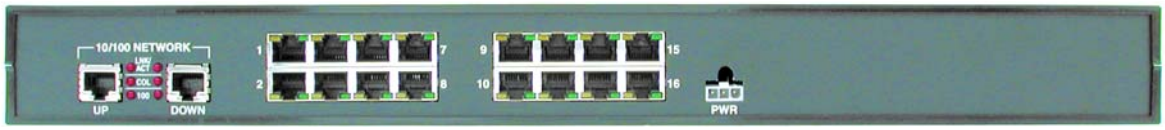
The **PWR** LED for the DeviceMaster 4 with DB9 ports is on the other side of the unit.

8-Port (DB9)

The **PWR** LED for the DeviceMaster 8 with DB9 ports is on the other side of the unit.

16-Port (RJ45) External Power Supply

The **PWR** LED for this model is on the other side of the unit.



16-Port (RJ45) Internal Power Supply

The power switch for this model is on the other side of the unit.

DeviceMaster PRO 16-Port (RJ45)

The power connector for this model is on the other side of the unit.

DeviceMaster Serial Hub 16-Port (DB9)

The power switch for this model is on the other side of the unit.

DeviceMaster RTS 32-Port (RJ45)

The power switch for this model is on the other side of the unit.

Notices

Radio Frequency Interference (RFI) (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class A digital devices pursuant to Part 15 of the FCC Rules.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This equipment complies with part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Comtrol Corporation may void the user's authority to operate this equipment.

Serial Cables (FCC 15.27)

This equipment is certified for Class A operation when used with unshielded cables on models with the RJ45 connectors and with shielded cables on all models with DB9 connectors.

Underwriters Laboratory

This equipment is Underwriters Laboratory “UL” listed.

Important Safety Information

To avoid contact with electrical current:

- Never install electrical wiring during an electrical storm.
- Never install the power plug in wet locations.
- Use a screwdriver and other tools with insulated handles.

Troubleshooting and Technical Support

This section contains troubleshooting information for your DeviceMaster. You should review the following subsections before calling Technical Support because they will request that you perform many of the procedures or verifications before they will be able to help you diagnose a problem.

- Troubleshooting Checklist on Page 97
- General Troubleshooting on Page 99
- Daisy-Chaining DeviceMaster 2E/4/8/16-Port Units on Page 101

If you cannot diagnose the problem, you can contact Technical Support on Page 102.

Troubleshooting Checklist

The following checklist may help you diagnose your problem:

- Verify that you are using the correct types of cables on the correct connectors and that all cables are connected securely.

  Note: *Most customer problems reported to Comtrol Technical Support are eventually traced to cabling or network problems.*

- Isolate the DeviceMaster from the network by connecting the device directly to a NIC in a host system.

Model	Connected to	Ethernet Cable	Connector Name
1-Port	Ethernet hub or NIC	Standard	10/100 ETHERNET
1-Port Embedded	Ethernet hub or NIC	Standard	RJ45 port (not labeled)
2-Port - 1E	Ethernet hub or NIC	Standard	10/100
2-Port - 2E (dual Ethernet ports)	NIC or Ethernet hub	Standard	10/100 - E1/E2
4/8-Port	NIC	Standard	DOWN
	Ethernet hub	Standard	UP
16-Port (external power supply)	NIC	Standard	DOWN
	Ethernet hub	Standard	UP
16/32-Port (internal power supply)	Ethernet hub or NIC	Standard	10/100 NETWORK

- Verify that the Ethernet hub and any other network devices between the system and the DeviceMaster are powered up and operating.
- Reset the power on the DeviceMaster and watch the **PWR** or **Status** light activity.

PWR or Status LED	Description
5 sec. off, 3 flashes, 5 sec. off, 3 flashes ...	Redboot™ checksum failure.
5 sec. off, 4 flashes, 5 sec. off, 4 flashes ...	SREC load failure.

PWR or Status LED	Description
5 quick flashes	The default application is starting up.
10 sec. on, .1 sec. off, 10 sec. on .1 sec. off ...	The default application is running.

- If the device has a power switch, turn the device's power switch off and on, while watching the LED diagnostics.
- If the DeviceMaster does not have a power switch, disconnect and reconnect the power cord.
- Verify that the hardware MAC address in NS-Link matches the address on the DeviceMaster.
- Verify that the network IP address, subnet mask, and gateway is correct and appropriate for the network. If IP addressing is being used, the system should be able to ping the DeviceMaster.
- Verify that the IP address programmed into the DeviceMaster matches the unique reserved IP configured address assigned by the system administrator.
- If using DHCP, the host system needs to provide the subnet mask and gateway.
- If using a driver for Windows, verify that you are addressing the port correctly. In many applications, device names above COM9 require the prefix **\\.** in order to be recognized. For example, to reference COM20, use \\.**COM20** as the file or port name.
- If using a driver for Windows, you can use one of the Comtrol tools, which are discussed in the *NS-Link User Guide*.
  - *Device Advisor*, which helps identify problems is a tab in the **Advisor** window of the Windows driver.
  - *Test Terminal* program, which can be used to troubleshoot communications on a port-by-port basis.
  - *Port Monitor* program, which checks for errors, modem control, and status signals. In addition, it provides you with raw byte input and output counts.
- If using a driver for Windows hosts, enable the **Verbose Event Log** feature under the **Options** tab and then reboot the system.
- Reboot the system and the DeviceMaster.
- Remove and reinstall NS-Link.
- If you have a spare DeviceMaster, try replacing the device.

General Troubleshooting

This table illustrates some general troubleshooting tips.

Note: *Make sure that you have reviewed the* *Troubleshooting Checklist on Page 97*.

General Condition	Explanation/Action
PWR or **Status** LED flashing	Indicates that boot program has not downloaded to the DeviceMaster. 1. Make sure that you have downloaded the most current driver from: http://www.comtrol.com/support/download.asp?partnumber=1800288. 2. Install the driver and configure the device using the MAC address. Make sure that you reboot the system. ***Note:*** *If the* **PWR** *or* **Status** *LED is still flashing, contact Technical Support.* 3. If you want to program an IP address into the DeviceMaster, you can use the procedure outlined in the *NS-Link User Guide* (Page 10). 4. Remove the NS-Link driver.
PWR or **Status** LED not lit	Indicates that power has not been applied or there is a hardware failure. Contact Technical Support.
Can ping the Comtrol device, but cannot open the ports from a remote location. (You must have previously programmed the IP address, subnet mask, and IP gateway.)	The NS-Link driver uses Port 4606 (**11FE** h) to communicate with the DeviceMaster. When using a "sniffer" to track NS-Link packets, filtering for Port 4606 will easily track the packet. The packet should also contain the MAC address of the device and the originating PC so that it can be determined if the packet is able to travel the full distance one way or not. If the 4606 packet is found on one side of a firewall or router, using sniffer, and not on the other side, then that port needs to be opened up to allow the 4606 to pass. This will most often be seen with firewalls, but is also seen in some routers.
Cannot ping the device through Ethernet hub	Isolate the DeviceMaster from the network. Connect the device directly to the NIC in the host system (see Page 97).
Cannot ping or connect to the DeviceMaster	The default IP address is often not accessible due to the subnet masking from another network unless **192.168** is used in the network. In most cases, it will be necessary to program in an address that conforms to your network. If you do not use the NS-Link driver to program the IP address, you only have 15 seconds to disable the Bootloader with Redboot to get into the setup utility. See RedBoot Procedures on Page 75 for the Redboot method of programming an IP address.

General Condition	Explanation/Action
DeviceMaster continuously reboots when connected to some Ethernet switches	The problem is caused by a L2 bridging feature called Spanning Tree Algorithm (STA) in the Switch. This feature is enabled by default in some switches. This features causes time-out problems on certain L2 protocols, such as our MAC mode. *Resolution*: There will be no firmware fix for this problem. Only ***one*** of the following fixes is required for resolution. 1. Disable STA in the switch. 2. Enable STA fast forwarding on the port. 3. Change the STA Forward Delay and Message Age to minimum time values. 4. On the device, set the time-out value to 0 (to disable loading of SocketServer) or 120. The command from the redboot prompt is “Timeout 120” without the quotes. *Problem Details*: STA by default blocks packets for 30 seconds after an ethernet port auto negotiates. Blocking of these packets causes the NS-Link driver load process to fail. The normal NS-Link load process is: 1. If NS-Link determines that it needs to load a device, it resets the device. It does this to get the device into Redboot mode. Only Redboot accepts “load binary” commands, which are needed to load the NS-Link binary into the device. 2. After a 6 second delay, NS-Link sends an ID query to the device. This query is to verify that the device is in Redboot and can accept “load binary” commands. 3. The device sends an ID query response. 4. NS-Link loads the device. If the device is not loaded after “timeout” seconds (default 15), it loads SocketServer. The above process fails when STA is running because the switch blocks packets for 30 seconds after the DeviceMaster is rebooted. Therefore, the ID query is not received by the DeviceMaster and after 15 seconds the device loads SocketServer. After 30 seconds, NS-Link finally can do an ID query, which reveals that the device is not in Redboot. NS-Link therefore reboots the device, and the process repeats.
DeviceMaster continuously reboots when connected to some Ethernet switches or routers	Invalid IP information may also cause the switch or router to check for a gateway address. Lack of a gateway address is a common cause.

Daisy-Chaining DeviceMaster 2E/4/8/16-Port Units

The DeviceMaster 2E/4/8/16-port models with external power supplies follow the IEEE specifications for standard Ethernet topologies.

When using the **UP** and **DOWN** ports, the DeviceMaster 2E/4/8/16 is classified as a switch. When using the **UP** port only, it is a simple end node device.

The maximum number of daisy-chained DeviceMaster 2E/4/8/16 units, and the maximum distance between units is based on the Ethernet standards and will be determined by your own environment and the conformity of your network to these standards.

Comtrol has tested with seven DeviceMaster 2E/4/8/16 units daisy-chained together using 10 foot CAT5 cables, but this is not the theoretical limit. You may experience a performance hit on the devices at the end of the chain, so it is recommended that you overload and test for performance in your environment. The OS and the application may also limit the total number of ports that may be installed.

Following are some quick guidelines and URLs of additional information. Please note that standards and URLs do change.

- Ethernet 10BASE-T Rules
  - The maximum number of repeater hops is four.
  - You can use Category 3 or 5 twisted-pair 10BASE-T cables.
  - The maximum length of each cable is 100m (328ft).

    Note: *Category 3 or 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*
- Fast Ethernet 100BASE-TX rules
  - The maximum number of repeater hops is two (for a Class II hub). A Class II hub can be connected directly to one other Class II Fast Ethernet hub. A Class I hub cannot be connected directly to another Fast Ethernet hub.
  - You must use Category 5 twisted-pair 100BASE-TX cables.
  - The maximum length of each twisted-pair cable is 100m (328ft).
  - The total length of twisted-pair cabling (across directly connected hubs) must not exceed 205m (672ft).

    Note: *Category 5 twisted pair cables look the same as telephone cables but they are not the same. The network will not work if telephone cables are used to connect the equipment.*
- IEEE 802.3 specification: A network using repeaters between communicating stations (PCs) is subject to the "5-4-3" rule of repeater placement on the network:
  - Five segments connected on the network.
  - Four repeaters.
  - Three segments of the 5 segments can have stations connected. The other two segments must be inter-repeater link segments with no stations connected.

    See http://www.optronics.gr/Tutorials/ethernet.htm for more specific information.

    Additional information may be found at http://compnetworking.about.com/cs/ethernet1/ or by searching the web.

Technical Support

If you are using an NS-Link driver for a Windows system, you should review the troubleshooting section in the *NS-Link User Guide for Windows* (Page 10) before contacting Technical Support.

It contains troubleshooting procedures that you should perform before contacting Technical Support since they will request that you perform, some or all of the procedures before they will be able to help you diagnose your problem. If you need technical support, use one of the following methods.

Comtrol Contact Information	
Downloads	http://www.comtrol.com/downloads
Web site	http://www.comtrol.com
Phone	(763) 494-4100

Index

A

add
DeviceMaster to existing installation 72
address
IP configuring 34
MAC format 43
agency
notices 95
associating
MAC address in NS-Link 43

B

baud rate/port 85
boot cycle
16-port
external power supply 27
internal power supply 31
PRO 29
1-port
embedded 19
enclosed 15
2-port 56, 58
DB9 23
serial terminal 21
32-port 31
4-port 25
8-port 25
Bootloader
downloading the latest 10
updating 70
version
Redboot 78
building
embedded serial ribbon cable 16
building cables
see cables

C

cables
embedded ribbon cable 16
null-modem
DB9 60
RJ45 61
serial terminals (4) 63
serial terminals (8) 65
RS-485 test 62
straight-through
DB9 60
RJ45 62
serial terminal (4) 64
serial terminals (8) 66
commands
#!DM 75
Comtrol Utilities
downloading latest 11
configuration
network
Redboot 77
overview 7
serial method 75
telnet 76
using PortVision Plus 34
using Redboot 75
connect
devices 53
contact information 102

D

daisy-chaining devices
16-port
PRO 28
16-port (external power supply) 26
2-port 2E
DB9 23
serial terminal 20
4-port 24
8-port 24
guidelines 101
data bits
NS-Link 86
DB9
loopback plugs 59
null-modem cables 60
straight-through cables 60
default
network settings 13, 34
network values 86
Developer's Kit 11
device driver
installation
Windows 2000 42
Windows Server 2003 41
Windows Vista 40
Windows XP 41
device drivers
download latest 10, 11
DeviceMaster
adding units to existing installation 72
configure network 75
replacing hardware 72
resetting
Redboot 78

devices
how to connect 53
how to daisy-chain
16-port models (external power supply) 26
2-port 2E model
DB9 23
serial terminal 20
4-port models 24
8-port models 24
disable
loading
Redboot 83
disable DeviceMaster
#!DM command 75
display
Bootloader timeout 83
IP address 83
MAC address 83
model number 83
Redboot version 83
telnet 83
DOWN port
16-port
external power supply 26
PRO 28
4-port 24
8-port 24
downloading
latest software and documentation 10
downloads
web site 102
drivers
installation
Windows 2000 42
Windows Server 2003 41
Windows Vista 40
Windows XP 41

E
embedded
installation 16
Ethernet cables 97

F
firmware
updating Bootloader 70
flow control 86

G
gateway address
default 13, 34
getting started 7

H
hardware
descriptions 13
installation 13
replace 72
hardware MAC address 43
help command
Redboot 83

I
installation
16-port 28
external power supply 26
internal power supply 30
1-port
embedded 16
enclosed 14
2-port
DB9 22
serial terminal 20
32-port 30
4-port 24
8-port 24
add new DeviceMaster to existing system 72
driver
Windows 2000 42
Windows Server 2003 41
Windows Vista 40
Windows XP 41
hardware 13
overview 7
PortVision Plus 33
interface standards 85
IP address
configuration
Redboot 77
default 13, 34, 77, 86
how to determine
Redboot 77
using PortVision Plus to change 34
ip command 83
IP gateway
default 77, 86

L
LCOM
downloading 11
LEDs
16-port
external power supply 27
internal power supply 31
PRO 29
1-port
embedded 19
enclosed 15
2-port 21, 23, 56, 58
32-port 31
4-port 25
8-port 25
analysis 97
load
TFTP or Xmodem 83
load command 83

loopback plugs
DB9 59
RJ45 62
serial terminal (4) 64
serial terminal (8) 66

M

MAC address
associating in NS-Link 43
format 43
mac command 83
model command 83

N

network
configuration
telnet 77
configuration with PortVision Plus 34
default values 86
how to connect to 13
protocols 86
network information
how to determine
RedBoot 77
NS-Link
associating MAC address 43
data bits 86
installation
Windows 2000 42
Windows Server 2003 41
Windows Vista 40
Windows XP 41
parity 86
SocketServer 52
stop bits 86
NS-Link drivers 10, 11
null-modem cables 60
DB9 60
RJ45 61, 62
serial terminals (4) 63
serial terminals (8) 65

O

overview
installation steps 7

P

parity
NS-Link 86
password
administrator
Redboot 83
password command 83
phone
Technical Support 102
PortVision Plus
changing network settings 34
downloading latest 10
installation 33
power supply
1-port (5VDC) 87
8-port 88
specification
16-port 89
1-port (5-30VDC) 87
2-port
DB9 88
serial terminal 88
4-port 88
PWR
LED
4-port 25
8-port 25
analysis 97

R

Redboot
administrator password 83
command overview 83
configure IP 77
LED activity 97
using for configuration 75
replace
hardware 72
reset
DeviceMaster
Redboot 78
reset command 83
reset/restore switch
2-port 67
ribbon cable
embedded 16
RJ45
loopback plugs 62
null-modem cables 61, 62
straight-through cables 62
RS-485
test cable 62

S

safety
information 95
screw terminals
see serial terminals
SDK 11
serial
connector types 85
embedded ribbon cable 16
serial method
configuration 75
updating firmware 79

serial terminals (4)
loopback plugs 64
null-modem cables 63
signals 56
straight-through cables 64
serial terminals (8)
loopback plugs 66
null-modem cables 65
signals 57
straight-through cables 66
serial tunneling 50
set
Bootloader timeout 83
IP address 83
password 83
telnet 83
signals
serial terminals (4) 56
serial terminals (8) 57
SNMP support 86
SocketServer
downloading latest 10
version 52
software
downloading latest 10
software control
specifications 86
specifications
power supply
16-port 89
1-port (5-30VDC) 87
1-port (5VDC) 87
2-port
DB9 88
serial terminal 88
4-port 88
8-port 88
Status LED
16-port
internal power supply 31
1-port
embedded 19
enclosed 15
2-port
DB9 23
serial terminal 21
32-port 31
analysis 97
stop bits
NS-Link 86
straight-through cables
DB9 60
RJ45 62
serial terminal (4) 64
serial terminals (8) 66
subnet mask
default 13, 34, 77, 86

T

Technical Support 97, 102
telnet command 83
telnet method
configuration 76
updating firmware 80
terminal
loopback signals (4) 64
loopback signals (8) 66
serial signals (4) 56
serial signals (8) 57
TFTP
load command 83
timeout command 83
troubleshooting 97
tunneling
serial 50

U

UP port
16-port
external power supply 26
PRO 28
4-port 24
8-port 24
updating
Bootloader 70
User Guides
downloading latest 10, 11

V

version
Bootloader
Redboot 78
SocketServer 52
version command 83

W

web site 102
Windows 2000
NS-Link installation 42
Windows Server 2003
NS-Link installation 41
Windows Vista
NS-Link installation 40
Windows XP
NS-Link installation 41

X

Xmodem
load command 83